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PERSONAL IDENTITY IN THE RECOGNITION OF
DESERTERS.*

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THE question of personal identity is one that has been investigated with much interest, especially by those in the medical and legal professions, in connection with charges of criminality, "personation" where property interests are involved, suppositious children, etc., and somewhat recently, and very thoroughly, in relation to the identification of *recidivists*—a French word applied to convicts who have served two or more terms in penitentiaries.

The difficulties which have surrounded the adjudication of these cases—the striking, and in some instances the marvellous resemblances between individuals, and the tragic, comic and sentimental situations developed by them have furnished material to writers of all degrees of literary ability.

The court records furnish instances of personal resemblances so remarkable that, but for the fact of their judicial attestation they "might be regarded as transgressing the limits of credibility

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as well as of probability." For the purpose of illustration, the case of du Tilh, said to be the most astonishing on record, is here given: A Frenchman named Guerre absconded from his home, leaving a wife to whom he had been married ten years, and entered the army; here he formed an intimate friendship with du Tilh, a soldier whose personal appearance bore a close resemblance to his own. After serving eight years together, during which time the latter learned all the particulars of Guerre's life, domestic affairs and relatives, du Tilh deserted, and fled to Guerre's house where he presented himself as the long lost fugitive; he was received and recognized by the family, relatives and neighbors, and lived with Guerre's wife three years, during which period two children were born to them; a conjugal quarrel over the sale of some land developed deficiencies in memory, and inconsistencies in conversation about former years, which finally resulted in a charge of imposture, which was tried by the courts, and the prisoner was condemned; he appealed to a higher court, but while awaiting its decision, the true Guerre appeared upon the scene, was confronted with and denounced du Tilh, who was subsequently hanged for his crime.

Advantage has been taken of permanent personal characteristics, such as scars, moles, osseous measurements, etc., to construct a system of classification from their recorded notation, whereby easy reference to and comparison with the previous and present description of a suspected individual may be made.

The application of this system to the general population is for obvious reasons impracticable, although in families where the ownership of large estates or other valuable property is hereditary, the dangers of "personation" would be minimized by making a record of this character in the case of all children, which could be attested by legal authority, and, if desirable, renewed on the arrival of the person at the age of legal inheritance. In organizations where such a record can be made a prerequisite to admission, it is both easy and effective, and this is especially so in armies.

The one blot upon the history of the United States Army is that of *desertion*; its causes I do not presume to discuss; they have been the subject of earnest inquiry by those high in authority, and numerous remedies for their removal have been ineffectually tried; no effort has been left untried to improve and render satisfactory the condition of the enlisted man, and the most liberal legislative acts, having this end in view, have been passed

by Congress. That its numbers can be materially lessened, and a particular class of offenders speedily recognized, I am satisfied, and the object of this paper is to explain the method by which this desirable end may be accomplished.

It is well known to all military men that the re-enlistment of deserters is a matter of frequent occurrence, but opinions are varied as to the extent of the practice; the experience of many officers, and the records of court-martial proceedings, show the fact, and some men have had the hardihood to boast, when on trial, of repeated offenses of this nature. A soldier at Columbus Barracks, Ohio, who was tried by a court-martial of which I was a member, replied, when asked to plead to the charge of desertion, "Which one, sir? I have deserted thirteen times." It is my opinion that the large number of desertions, annually reported, is in great part made up by the repeated acts of these men—the "bounty-jumpers" of the late war, and I believe the evil will exist until some plan is devised by which the practice may be effectually prevented.

In the consideration of this important matter there are two practical questions to be answered.

1st. Can deserters be prevented from re-enlisting? If so, how?

2d. Having re-enlisted, and being still in service, can they be identified? If so, how?

To the first of these questions there is so far but one answer, viz., Yes: By indelibly marking, at a designated spot (escutcheon—tattooing), the person of every recruit. By this means the recruiting officer would be enabled to determine whether an applicant for enlistment had previously been in the Service, and if so, to decide whether he was a proper person to re-enlist. The adoption of this method has been suggested and urged by many officers of rank and influence, some agreeing to submit their own persons to the operation as an example to the men; medical officers have proposed (with the added view of teaching the soldier how to control arterial hæmorrhage) that the location of the precise point at which the principal arteries in the limbs may be compressed, be indicated by tattoo marks, but the possibility of infecting the system by the introduction of specific or septic poisons, the association of a tattoo mark as a *brand of servitude*, together with the legal objections, which may be raised against the operation if done against the will of the

subject, effectually, and in my opinion very properly, bars its adoption in our Army.

The vaccine scar is, however, free from such objection, and many recommendations to use it for this purpose have been made; Colonel J. H. Baxter, U. S. A., finally suggesting the outer side of the leg, below the knee, as the "point of election" for the operation; this was adopted and affords, when it leaves a scar, a mark of identity for that individual; but as the majority of recruits have already been vaccinated, and the percentage of successful re-vaccinations is small, the operation cannot be relied upon to leave a similar mark upon *all* men entering the Service. Statistics from the medical department show about forty per cent. of successful vaccinations and re-vaccinations among men who enlist or re-enlist; to this may be added about ten per cent. of cases where, although the operation was not technically successful, the irritation it produced has been sufficient to leave a scar; there are thus about fifty per cent. of the men received into the Service who bear an indelible mark by which their enlistment may be recognized. This is the most that can be hoped for at present to prevent the re-entrance of deserters to the Army.

The answer to the second question may be given in the affirmative, *provided* a careful and painstaking descriptive record of every recruit is made. Several methods for describing the individual peculiarities of men, and for utilizing the description as a means of identification have been suggested, and one has been most successfully carried out. They all have for their object the immediate and successful comparison of a present description with a descriptive record made at a previous time. Should these agree, the additional evidence of signature, personal history, etc., will complete the record and establish the identity of the individual.

Of these methods, three have been in use, viz.:

I. The photograph.

II. The measurement and record of unchangeable anatomical parts.

III. The record of permanent bodily markings.

I. THE PHOTOGRAPH.

It will naturally be supposed that the reproduction of the features in a photograph, the "likeness" of the picture to the person to be identified, would be the most reliable of all means

employed. By this well-known process the features are portrayed with mechanical accuracy, and in many instances the expression is good, but the picture may lack many essential factors to make it a *likeness*, and without these it would, for general use, be of no value. The presence or absence of hair and beard, the facial expression, the condition of the person, whether fat or lean, sick or well, the pose, the dress, the light in which the picture is taken, will, any or all, make such changes that two pictures even when taken by the same artist, and under similar conditions as to light, situation, etc., will sometimes be unrecognizable as portraying the features of the same individual. To illustrate this, I obtained the consent of two soldiers, both wearing heavy beards, to be photographed at the Army Medical Museum. Eight pictures of each man were taken, two in uniform and two in citizen's dress (one full-face and one profile), with hair and beard uncut; and a like number in similar dress after the hair had been closely cut (clipped), and the beard removed; the men were, after a time, brought to the War Department, and an attempt was made by several officers to identify them by means of these photographs. An attempt was also made to separate and identify the pictures of the men, but neither was successful; some good guessing was done, but no one was prepared *to swear to the point of identity*. Certain features, however, are unchangeable; these, by careful measurement, and subsequent comparison with a photograph previously taken, may establish with some degree of certainty the identity.

In the full face, the width of forehead, nose and jaw, and in the profile any portion of its contour, *i. e.*, that of the forehead, the nose, the lip or the chin; as also on the side face, the ear with its curves may be chosen. Mr. Galton has suggested a comparison of the profile contours with a selected standard, sorting them into proper classes upon the basis of measurements, as will be explained further on. Even if the objections I have mentioned were untenable, the difficulty, not to say impossibility of comparison among many thousands, or hundreds of thousands of photographs, renders this method of identification practically valueless, and photographs may now be relegated to the Rogues' Gallery of Police precincts to serve as objects of curiosity to visitors. M. Bertillon, although aided by his admirable system of classified measurements, does not consider them as anything more than convenient adjuncts.

II. BODILY MEASUREMENTS.

The value of the photographic picture lies in the faithful portrayal of the facial contours; the value of measurements is based, 1st, upon the unchangeable nature of the portions of the body that are measured; 2d, upon the agreement of the measurement, in individual cases, with similar measurements of the examined person, and, 3d, upon their systematic classification and division for readiness of reference. To fulfil these conditions it is necessary to make use of the bony human frame, as being less liable to change; and in order that the element of uncertainty in measurement may be eliminated, such portions should be chosen as have the least covering of flesh and sinew. M. Bertillon, of France, proposed and put in operation some fourteen years ago, a system comprehensive of all these data; his classification of the several measurements being seven in number, as follows: of the skull, its length and width; the left middle and little fingers; the left foot; the left forearm; the right ear, and the outstretched arms, of which he took the lengths; and the height, standing and sitting. The instruments necessary are caliper and sliding compasses, and sliding measuring rods, all made especially for this purpose.

These primary measurements are classified according as they are large, medium or small; there are thus three divisions of head lengths, each of which is subdivided into three divisions of head widths; again, each of these is subdivided into three of middle finger lengths, then into three of little finger lengths, then into three of foot lengths, and so on through the various primary classifications, which are thus equal to three multiplied into itself seven times, that is to say, their number is 2,187. This system is best described in the following extracts from the discourse of M. Bertillon, delivered before the International Prison Congress at Rome in 1885. Taking for his illustration 100,000 photographs of French criminals, and classifying them according to sex, etc., he says:

"Each one of these original divisions is then subdivided without regard to the stature of the individual, into three series, according to the *length* of the head. These new subdivisions numbering nine, would then contain those

With heads of small length, 6,000 photographs and over.						
" " " medium "	"	"	"	"	"	"
" " " large "	"	"	"	"	"	"

" These subdivisions of 6,000 are again divided into three groups, according to the width of the head, with the following result :

Those of small width, 2,000 photographs.

" " medium " " "
" " large " " "

" The length of the middle finger will give a fourth indication, still more precise, and will again subdivide each of the foregoing packages of photographs into three parts, thus reducing them to series of 600 each. Each will be again subdivided into still smaller portions, by taking the length of the foot for basis of subdivision, or the color of the eye, or the measurement of the outstretched arms, etc. A division by the length of the foot would give a quotient of 200, reduced by a division of the outstretched arms to 63, again reduced by the color of the eyes (7 divisions) to 9, in each final division.

" The meaning of all this is, that by the means of five new co-efficient anthropometric measurements (the sex, stature, age and the color of the eyes, having always been considered in the old way of taking descriptions), the Paris collection of photographs could be divided into groups of not more than ten photographs each, which it would be an easy matter to examine rapidly and carefully.

" Nothing is more simple or expeditious than the taking of these measurements, an operation requiring two to three minutes' time only, and within the range of the intelligence of an ordinary man.

" The variations in individuals are so great, and the precision of the measurements so perfect, that, as has been shown of one hundred thousand subjects, there are hardly ten who will show approximate figures.

" As to practical results, only few were produced, until the commencement of the second year of carrying on the system. Necessarily time had to be allowed for the collection to extend itself. But these results are now growing in number rapidly. Thus during the first year we have counted only forty-nine individuals that were measured and recognized by the employés of the service as having been recommitted under assumed names.

This number has increased to 241, for the year 1884, and to 450 for the first six months of 1885.

" Now here is a man by the name of John Bernard, arrested and brought before the service on November 13, 1884, who is the first to declare and assert that he has never been arrested or measured before.

" We proceed to take his description by measurements, and find the following expressed in this metric system :

Height, 1, 75.
Length of head, 19, 5.
Width of head, 16, 4.
Foot, 27, 2.
Middle finger, 12, 1.
Fore-arm, 48, 2.

" This information having been obtained and marked down, we proceed with its aid to make our search by measurements. Let us start with the 'length of the head.'

" In which of the three categories (small, medium, large) must this man's photograph be found, provided, of course, that it is in the collection at all?

" The figures tell us that our subject measures 19,5, and must therefore be looked for in the category of the largest lengths, viz.: from 19,5 to the end.

"At once we eliminate the other two categories. Suppose each one of them contains 500 descriptions and photographs, we have discarded 1,000 of them. The remaining 500 photographs are again subdivided according to the width of the head. The widths are divided as follows:

1. From the beginning (a) to 14.9.
2. From 15.0 to 15.4.
3. From 15.5 to the end (z).

"Our Mr. Bernard shows the width of his head to be 16.4; he ought, therefore, to be looked for in the third or last of these subdivisions, 15.5 to z. Consequently we eliminate the other two classes of this category.

"The remaining subdivision is subdivided again without further reference to the length or width of the head, by the length of the middle finger:

- The small ones from (a) to 11.2.
- The medium ones from 11.3 to 11.7.
- The large ones from 11.8 to the end (z).

"Mr. Bernard's little finger measures 12.1, and he belongs therefore to the last named of the above three classes, 11.8 to z.

"Then we measure the foot, the fore-arm, and finally the height. From elimination to elimination we have arrived at the point where we have to look over a few photographs only, which is done in a few seconds, and among them we find one exhibiting the same measurements, figure for figure within one millimetre, and presenting the identical features of our Mr. Bernard so plainly that the identity between the two individuals can no longer be doubted. There is this principal difference however, that the first photograph taken about 16 months before the other, does not bear the name of Bernard, but the name of Desjardin, who is a criminal of the worst kind, and has been wanted by the police for months past, under the name of Desjardin."

III. PERMANENT BODILY MARKINGS.

By these are meant, scars of all kinds, whether from cuts, shot wounds, abscesses, burns, etc., mutilated, distorted or amputated members, physical abnormalities, as tumors, redundant or webbed fingers and toes, etc., etc., moles, "birth marks," tattooings, peculiarity of markings either in color or structure of the iris, and last and perhaps most interesting, "*finger* markings."

The value of these marks as means of identification is recognized and admitted by all observers. M. Bertillon says "that they offer a greater guarantee for identification than measurements, and that they would take their place altogether if it were possible to use them as a basis of classification." This I think can be done, and at my suggestion the system now in use at the War Department, and described further on, was introduced. Some doubt has been expressed as to their universal presence, but I am of the opinion that if a careful search is made by a medical expert no person will be found without one or more of them. An examination of all the enlistment figure cards received at the War Department up to the date of writing, numbering several hundred, failed to disclose

a single one that did not bear a record of one or more personal marks.

Concerning the *permanence* of bodily markings, no question can be raised excepting as to scars and tattooings; scars may be transient or permanent in character; the former are generally the result of clean incised wounds that are not deep, and have healed without suppuration; knife cuts, and the cuts made in the operation of cupping or bleeding are examples; these scars may disappear in the course of two or three years; but where there has been any loss of substance, as in a lacerated wound, an abscess, or in certain skin diseases, the scar is permanent. Tattoo marks are not always indelible; they may be effaced, or the design so adroitly altered as to be past recognition. Caspar, of Berlin, states that in thirty-seven cases he found six in which the marks had completely disappeared. Hutin, in France, found out of 3,000 cases, 117 partially effaced, and forty-seven completely effaced. Tardieu found, in ninety-two cases, twenty-one partly effaced and fourteen entirely disappeared. Dr. Robert Fletcher, in a very interesting article on tattooing, says:

"It is not the lapse of time, however, which causes the disappearance of the marks. but the slight depth of the pricking or incision, the nature of the coloring matter, and the frequent friction on the skin which some trades necessitate. If the tattooing be quite superficial, penetrating the epidermis only, it is no unusual thing for it to disappear entirely in a short time. Vermilion and the vegetable blues are much less enduring than black, so that a part of a design is often preserved when the rest of it is entirely gone. Thus, of a soldier, there may be nothing left but helmet, sword, coat and boots, the face and other parts having faded out completely. Of all colors employed, Indian ink is the most permanent, and if with that pigment, or with charcoal, the punctures have reached the corium, or true skin, the design is almost certain to be indelible. Next to the blacks, indigo is the most staying color. Tattoo marks may be removed by artificial means, though they have wonderful power of resistance; they are, however, generally altered in pattern by additional tattooing."

"A horse-shoer who had become a blacksmith adroitly altered a horse-shoe into a forge, adding two figures, beating iron upon it. A butcher, changing his occupation, converted a bull's head into an expanded rose. A baker had inscribed the name 'Adele' upon his arm, and when in due course of time she proved faithless, he converted the letters into the well-known cocked hat of Napoleon."

The peculiarities of structure and color markings of the *iris* are infinite in variety; its normal circular form may be distorted in one or both eyes into many shapes—its color may be different in the eyes of the same individual, the right being a sky blue, while the left is brown—or it may be dotted with particolored spots, etc.

The most characteristic and permanent of personal marks are

"the small furrows with the intervening ridges that are disposed in a singularly complex yet regular order on the under surface of the hands and the feet." *Finger marks:* These lines take their origin from various centres, one of which lies in the under surface of each finger tip; they proceed from their several centres in spirals and whorls, and distribute themselves in beautiful patterns over the whole palmar surface; a corresponding system covers the soles of the feet." In some individuals they are symmetrically developed, all the fingers of one hand having a similar arrangement of lines, which are reversed in the other; in others the arrangement differs entirely in both hands. At first sight it would seem almost impossible to obtain any fixed point for study amidst this confusion of spiral and oval whorls, open loops and waving lines, but on closer examination, particularly if a magnifying glass is used, or better still if an impression made by the markings is enlarged by photographic art, several points may be selected: 1st, is the origin of a furrow, which may arise in the middle of a ridge; 2d, is its bifurcation, forming a Y, and, 3d, is the direction and shape of the central loop or whorl. Perfect impressions of finger marks are not easy to make. "The proper plan seems to be to cover a flat surface, like that of a piece of glass or zinc, with a thin and even coat of paint, whether it be printer's ink or India ink rubbed into a thick paste, and to press the finger lightly upon it so that the ridges only shall become inked, then the inked fingers are pressed on smooth and slightly damped paper."

The permanence of these marks throughout the life of the same person appears to be well established. Mr. Galton, an English authority, in an article on Personal Identification, gives in evidence on this point, wood-cuts of enlarged impressions of the fore and middle finger tips of the right hand of Sir William Herschel, made by him in the years 1860 and 1888 respectively. "There is an obvious amount of wearing and of coarseness in the latter, but the main features of both are the same."

Finger marks have been found on pre-historic pottery in Japan, and Egyptians used them as a stamp to official documents. The Chinese take advantage of this to identify their important convicts, at least in some parts of the Empire, and to authenticate the signatures of illiterates; their sailors, shipping on junks, are made to sign with five fingers in order to get a more certain identification. British officers in India used them as a sign manual for the natives, 1st, with pensioners, 2d, in registration, and 3d, with



IMPRESSION OF THE FORE AND MIDDLE FINGER TIPS OF
THE RIGHT HAND OF SIR WILLIAM HERSCHELL,
MADE IN 1860 AND 1888 RESPECTIVELY.

convicts and criminals ; the object being " to make all attempts at personation or at repudiation of signatures quite hopeless." " It put a summary and absolute stop to the very idea of personation." Mr. Galton states that " Mr. Gilbert Thomson, an officer of the American Geological Survey, who, being in Arizona, and having to make his orders for payment on a camp sutler, hit upon the expedient of using his own thumb mark to serve the same purpose as the elaborate scroll engraved on blank cheques, namely, to make the alteration of figures written on it impossible without detection." Whether this somewhat unique means of identity will be made available in military life is an open question.

In order that practical use may be made of bodily markings, a careful and systematic examination of the person, and an equally careful record of the marks that are found, is indispensably necessary. The person to be examined should be stripped, the body mapped into regions, right and left front, and rear, and each region thoroughly searched. In recording the description of such marks as are found, exact location should be given, with distance and direction from the nearest anatomical landmark. The mark itself is to be described: 1st, as to shape, whether rectilineal, curved, oval, circular, undulating or oblong, and if curved, which way its concavity faces; 2d, as to direction or inclination, whether vertical, horizontal or oblique, and, 3d, by its dimensions when not too small for measurement or notice. For the purpose of classification and ready reference, the record should be made on a card bearing on one side the outline of the front of a human figure, and on the other of the back, the figure being divided by dotted lines into as many anatomical regions as may be desired; the color of hair and eyes, and the height are also recorded. Any one of these factors may be taken as the basis for classification, the subdivisions of the primary classes being made by regions, and the search for duplicates conducted upon the principle of elimination as used by M. Bertillon in his system.

Which of the methods that have been described is to be selected for the identification of men who have had previous service in our army? The photograph is, as has been shown, unreliable, difficult of classification, and the expense necessary for its use considerable; it should, therefore, be discarded. The Bertillon method is unquestionably reliable, and has moreover stood the test of actual trial, but against its adoption, as indeed against that of the photograph, is the ethical objection that they were both conceived,

and are now used, for the detection of criminals. The citizen who desires to enter the army of the United States does so under the belief that he is engaging in an honorable profession, and the code which is presented to him, both in the language of his enlistment contract, in the Articles of War, and in the Regulations of the Army, is drawn with a view to sustain and strengthen this belief. The effect of meeting him at the threshold of his enlistment with a system of identification which is stamped with criminal associations, and pre-supposes an intent on his part to violate his contract, cannot but be fatal to his honorable purpose, and result either in driving him in disgust from the recruiting rendezvous, or in suggesting a future escape from a service into which present necessity has forced him. While an ethical objection may be urged against any record of personal characteristics, it has least weight in the matter of bodily markings, an examination of which, it is well known, is necessary for the determination of the physical fitness of the applicant for military duty, and their record equally necessary to identify his body on the field of battle. For these reasons, the method of body markings seems to be the one to select for the purpose under discussion. Orders from the War Department now require that "a record of such indelible or permanent marks as may be found upon the person of an accepted recruit will be made upon an outline figure card, and forwarded promptly on completion to the Surgeon-General of the Army. The examination and record of marks of recruits belonging to the general service will be made by the medical officer at a depot; of recruits enlisted at military posts, by the post or attending surgeon; and of recruits enlisted at other places where the services of a post or attending surgeon cannot be obtained, by the enlisting officer." The necessity for thoroughness of examination and accuracy of description, led to the selection of a medical officer to perform this duty; one whose training as a professional expert would lead him to look for and discover physical abnormalities that might escape the eye of even an experienced layman. The figure cards when completed are immediately forwarded to the Surgeon-General's Office for classification.

Height is selected as the primary division, and the cards are sorted into classes falling within the measurements of 64 and 65 inches, 66 and 67, 68, 69, 70, 71 and 72, 73, 74 and 75; these are subdivided into color of eyes, and these into the four surface divisions of the body, viz.: right and left front and right and left rear.

As the figure cards are needed for special reference, their record is transferred to a card specially prepared for the purpose, and they are filed alphabetically according to the surnames borne upon them. This prepared card, known as the "Cabinet Card" is made of the best Manilla paper, is $8\frac{1}{2}$ inches by 2 inches, and has printed on its face in a row along each side, thirty-six small circles $\frac{1}{8}$ of an inch in diameter; across the top are printed seven circles, and across the bottom three others. The seven circles at the top of the card indicate the subdivision of height; the three at the bottom, the color of the eyes; the circles on the right, the anatomical regions of the right and left front of the figure; and those on the left, the same regions of the right and left back. When a figure card is received it is stamped with a serial number, the same number being stamped upon the cabinet card. With an ordinary "Conductor's punch," made for the purpose, which cuts away the outer three-fourths of a circle, a clerk punches such of the circles as represent the height, color of eyes, and regional markings on the figure card. In cases where marks are congenital, such as moles, birth marks, discoloration of iris, etc., a cabinet card of green color is used; for all other markings the card is of the ordinary brown color. The cabinet card is then filed in the pigeon hole to which it belongs; this being determined by the surface division (which is numbered 1, 2, 3 and 4) bearing the lowest number in which marks are found. When in the ordinary course of sorting, two or more cabinet cards appear in the same pigeon holes, comparison is made between them, for duplicates; if none are found, search is made through the other pigeon holes. If a duplicate is discovered it is sent together with the original figure cards, to the Adjutant-General for comparison with the enlistment papers and such further action as the case may demand. It should be clearly understood that claim is not laid *for the final determination of a question of identity* by the system that has been described; the evidence it gives is, however, so reliable, that its weight in connection with such other evidence as legal tribunals may require, entitles it to serious consideration, and affords a reasonable hope of success in the accomplishment of the end in view.

The importance of bodily markings as a means of personal identification has been but little appreciated or understood by army officers, and it is therefore not surprising that their record on the enlistment papers has been meagre and valueless; in fact,

under some circumstances it has been rather a means of defeating than aiding justice. Some recruiting officers have entirely disregarded the old regulations requiring notation to be made of scars and marks, others have made partial record, others have signed enlistment papers on which has been entered a record they evidently did not read, while *a very few* have conscientiously performed their duty in this respect. A long experience in the examination of recruits at rendezvous, depots and military stations, has developed some odd incidents in this particular; for example: I recall the case of a recruit who was received at Columbus Barracks from a rendezvous subsidiary to that depot; a typical German blonde, with flaxen hair, sky blue eyes, peachy cheeks and the fairest of skins, who was described as follows: "red hair, black eyes, dark complexion!" It was by no means uncommon to receive men whose bodies bore well-marked cicatrices of wounds, or tattooing of extensive surface and elaborate designs, but whose descriptive records were innocent of any notation of such facts. The following extract from a letter written to me by one of the most efficient officers on recruiting duty is of interest in this particular:

"J. W. deserted from this rendezvous 29th September, '89. He left two discharges here. The following are the three descriptions:

"On 1st discharge: Age, 31 years. Height, 5 ft. 6½ in. Complexion, dark. Eyes, hazel. Hair, dark.

"On 2d discharge: Age, 33 years. Height, 5 ft. 6 in. Complexion, fair. Eyes, grey. Hair, dark.

"On descriptive book: Age, 35 ½ years. Height, 5 ft. 6 in. Complexion fair. Eyes, blue. Hair, light."

And that there has also been, even at the headquarters of the Recruiting Service, a lack of appreciation of bodily markings as a means of identification, this further extract from the same letter shows:

"March 19, '89, there was a circular sent around from Hd-qrs. R. S., warning Recruiting officers against Timothy O'Brien, who had enlisted fraudulently seven times in twelve years—that they know of. No marks given beyond eyes, complexion, hair and height. None of them peculiar. Now, I enlisted him in August, '88, and I gave the following marks: Foul anchor right hand. Bracelet on wrists. Female figure in tights, 10½ inches long, left forearm. Those marks now constitute Mr. O'Brien's strongest safeguard *against* identification. There is not a month, at any rendezvous doing a considerable business, where men answering his description, well enough, would not present themselves; but would not the recruiting officer think—would it be reasonable to expect him to think otherwise, than that such marks would not be passed over, and that therefore the man bearing them was *not* the man from whose description they were omitted?"

It will thus be seen that the success of this system, which is now experimental, depends in a large degree upon the accuracy of search and record made by the examining officers. A perfunctory performance of their duty will not simply embarrass—it will be fatal to it, and defeat one more effort which the War Department is making to increase the efficiency of its enlisted force. It is true that there may be an element of uncertainty in the work done in the Surgeon-General's Office; the clerk in charge may make a mistake in punching the record card, or in placing it in its proper pigeon hole, but this element is a small one, can be easily corrected, and it is believed will interfere but little in the speedy identification of the class of "repeaters," who have so long been a curse to our service. Should this system fail, the addition of the osseous measurements proposed by M. Bertillon can readily be made on the figure card, and that system, notwithstanding its ethical objection, be introduced.

A CENTRAL AMERICAN INTER-OCEANIC CANAL AND ITS STRATEGIC IMPORTANCE TO THE UNITED STATES.

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IN considering the strategic advantages of an inter-oceanic canal through Central America, it is intended to discover what increased facilities will be given the United States by such canal in all operations of war by sea or on land, in attitudes both defensive and offensive, according as the requirements of prudence or safety may dictate.

It is necessary, therefore, to discuss separately various subdivisions of this subject, each of which will influence the situation at the outbreak of hostilities and bear directly on the fate of all subsequent movements, both on the part of the United States and of the opposing power.

The subdivisions are as follows:

I. The routes of canals undertaken or to be attempted.

II. Description of these routes, as to:

1st. Directness.

2d. Rapidity of trans-shipment.

3d. Condition of climate and country.

4th. Facility for the establishment of depots.

5th. Accommodations for fleets and armies.

III. Nature of the treaty or alliance to be entered into by the United States with the Central American States, through whose provinces the canals pass.

IV. Question considered in the case of hostilities with any South American State.

V. Question considered in the case of hostilities with any State not in the Western Hemisphere.

In the discussion of these questions it is useless to adopt the defenses of the United States on land and sea as they exist to-day. The assumption that with our present infantile navy and microscopic army we could attempt to hold such an advanced

strategic front as would be the line of a Central American canal is out of the question.

I. Routes of canals undertaken or to be attempted.

The Panama Canal stands alone as one in which theory has given place to practice. It was begun in 1881, under the supervision of a company, at whose head is Count Ferdinand de Lesseps. It is a private enterprise, the stock being in the hands of any who are willing to buy. It is in no way a national undertaking. At one time a project was formed to induce the French Government to allow the placing of a proposed lottery loan which, however, fell through. Since its inception, however, the plans have materially changed, and the French company which undertook it has ceased to exist. Up to 1887 the obligations of the company amounted to \$350,000,000, with about one-fifth the work done, and the main difficulties and expenses contained in the remaining four-fifths. The latest information on the canal is contained in a paper by Lieut. R. P. Rodgers, U. S. N., in the *Popular Science Monthly*, for January, 1888. He says that about 30 per cent. of the excavations are completed. The estimated final cost by the company is \$375,000,000, but he states that the great sacrifice at which the loans are obtained will double this amount. Speaking of the part still unfinished, he says: "To my mind the deep cut at Culebra is the great problem of the enterprise; already its side threatens to bar the way."

De Lesseps has repeatedly asserted and published that the canal will be open in 1889, while Lieut. Kimball is of the opinion that it will be completed, if at all, in about forty years. A Paris journal states that De Lesseps is moving heaven and earth to complete the task in the time named. The stockholders, no doubt, wish he would move less heaven and more earth.

A commission called the "Inter-Oceanic Canal Commission," was appointed by the President in 1872, which examined into various routes for canals across Central America. The routes submitted to it were: The Nicaragua route, the Atrato-Nipipi route, and the Panama route. After a careful consideration of them, whereby it was shown that other routes submitted had little or no importance, the Commission decided upon the Nicaragua route as the most feasible.

Efforts were made in 1881, and still continue, to induce the Government to undertake the construction of a ship railway across the Isthmus of Tehuantepec. The plans for this scheme

were laid before Congress by Mr. James B. Eads, but no action has yet been taken.

The prospect of a ship connection between the two oceans is therefore dependent on these three enterprises, namely: the Panama Canal, the Nicaragua Canal and the Tehuantepec Ship-Railway. The Panama and Nicaragua Canals are already private enterprises and the other may become so. On the other hand, the United States will oppose the absorption of the Panama scheme by any foreign nation or nations, and may undertake one or both of the remaining projects.

Commercial considerations are not within the province of this paper, nor is the decision of the Government relative to the adoption of any particular scheme urged. But an attempt shall be made to discover what increased advantages one route may claim over another, as to the establishment of strategic lines, as a base of operations, or as a line of defense, in time of war, in which the United States may be engaged.

II. Descriptions of routes following the subdivisions already indicated.

1st. Directness.

The Panama Canal is designed to be without lockage except a tidal lock at Panama. Its length will be 45.3 miles and will connect the cities of Colon and Panama. It is the shortest possible canal route between the oceans. It follows the general course of the Chagres River, crossing it and its tributaries at several places. The course of the stream at these points is straightened, thus avoiding the mingling of the waters of the rivers and of the canal. About 27 miles from Colon an immense dam or barrage is to be constructed to turn aside the lower water of the Trinidad and to prevent the overflows during the rainy season. The ports of Colon and Panama can accommodate large fleets, and a central station permits vessels to pass each other readily. The tidal lock at Panama has a width of 656 yards and is so constructed that ships may discharge from it. The latest plans make it possible to do away with this lock altogether, substituting a wide and deep basin.

On the Atlantic side the Nicaragua Canal ends in the decayed harbor of Greytown, which by means of a jetty and dredging is to be restored. On the Pacific side the canal descends to Brito, where a harbor is to be formed by means of a breakwater, a pier, and dredging. The line of the Nicaragua Canal, from Greytown

to Brito, has a length of 169.8 miles, of which 39.98 miles are canal proper and 132.82 miles are open navigation through Lake Nicaragua, the river San Juan and the basin of the river San Francisco. The summit level is 144.8 miles long. The elevation of the lake is 110' above the mean sea level. The water supply of the canal is to be from Lake Nicaragua. There are to be 3 locks east, and 4 west of this level, and are to be of a length sufficient to contain the *City of Rome*. The length of the canal east of the lake is to be 19.48 miles; west, 17.27 miles. Its estimated yearly capacity is 20,000,000 tons. The lake requires to be excavated and dredged for a distance of $8\frac{1}{2}$ miles; San Juan River for 24 miles and the San Francisco very slightly; making in all about 40.3 miles. The tidal lock at Brito is 1.4 miles inland, thus extending the harbor that far. At Greytown, lock No. 1, is 11.6 miles inland. The canal here is to be enlarged, forming basins where vessels can wait or pass each other without detention. A dam at Ochoa, 64 miles east of the Lakes, will back up the waters of the San Juan, forming an extension of the lake, and is to be at no place less than 1000 feet wide.*

The Tehuantepec Ship-Railway is designed to cross at the narrowest part of the Isthmus of Mexico. The Atlantic terminus is at the town of Minatitlan on the Coatzacoalcas River, and at about 25 miles from its mouth. This river is broad and deep, and needs improvement by artificial means at only one point. A jetty is to be built at the mouth of the river to deepen the bar that has formed there. From here the line ascends over the Atlantic plains to an undulating table-land, reaching further on, the irregular spurs of the main Cordilleras. The line then follows the valley of a small stream, from which it emerges into the plains of Tarifa, which mark the summit of the line, 736' above low tide. Leaving the plains, the road pierces the mountains at the pass of Tarifa, from which point it descends gradually to the plains of the Pacific slope, having traversed the Isthmus from ocean to ocean, over a distance of 134 miles. The terminus on the Pacific side will be at Salina Cruz, or on one of the Lagoons.

2d. Rapidity of Transit.

*The vigorous work which has been done on the plans of the Nicaragua Canal has made changes in these figures. The locks have been reduced in number to six, and some have been increased in lift. The amounts of dredging and excavating are therefore, less, and the time of crossing correspondingly shorter. My calculations in this connection may, therefore, be taken as approximate, but the error thus introduced is on the safe side.

The latest change in the Panama Canal contemplates ten locks.

A vessel to traverse the Panama Canal would proceed at the allowed rate of 6 miles per hour; then allowing one hour at each lock, where in war emergencies there would be no delay, it would occupy 17.5 hours in the passage.

In the case of the Nicaragua Canal, at Greytown the vessels enter upon their passage of the Isthmus. They travel at the rate of 5 miles per hour in the excavated channel, 7 miles per hour in the San Juan River, and 10 miles per hour in the Lake; then allowing one hour for passing each lock, it will require nearly 32 hours to make the transit.

To transport a ship by means of the Ship-Railway, the vessel is raised and lowered to and from the road by means of pontoons, which would occupy about one hour. The transit is made at the rate of 12 miles per hour, during which 5 stops are made at turntables, each stop occupying 15 minutes. The ship will require, therefore, a little over 13 hours to make the passage.

In considering the rapidity of transit in connection with advantages to be gained in military movements by the passage of these canals, it is necessary to have:

First. Reasons for such need; and,

Second. Origin of such movements and their destination.

The need would become apparent in a war with any South American State or States on the Pacific Coast, when a rapid reinforcement and concentration of our Pacific fleet would be necessary; for a more proper defense of our line of western seaboard; for a more certain protection of convoys or merchant fleets which a long *détour* would separate or delay.

The origin of such movements would be naturally from the mouth of the Mississippi and from our large seaports.

Time is to be measured, then, not across the Isthmus only, but from the starting point of all military enterprises, whether for entrance on active hostilities or for the armed protection of commerce.

By an easy calculation, remembering the distance from New Orleans, and from the Florida Straits, to Colon, to the San Juan River, and to Tehuantepec, we find that a reinforcement would reach Panama in 4.9 days, Brito in 5 days, and Salina Cruz in 2½ days. But in movements north of Tehuantepec, the Nicaragua route shortens the distance by a day and a half.

3d. Condition of climate and country.

Panama lies under a hot tropical sun which but adds discomfort to the almost unceasing torrents of the long wet season. The heavy air, filled with gnats and mosquitoes, is most depressing, while the well-known and dreaded fevers of the Isthmus have given Panama a most unenviable reputation.

The Canal Company has erected a large hospital at Panama and others along the route, but in spite of these generous accommodations they are unable to contain all the sick among the employés.

At Nicaragua the rainy season is much shorter than at Panama. The climate is salubrious and the soil productive. Cattle abound among the hills, while all the products of the tropics grow in the valleys. There is no disease peculiar to this part of the Isthmus, and with the exception of malaria in the lowlands of the lower San Juan, the Isthmus is peculiarly free from the common disorders of the tropics.

The climate at Tehuantepec is less trying than at either the other places. The rains are not so frequent nor the sun so torrid. The soil is wonderful in its productive qualities, while the hills are rich with precious metals. The forests are dense and valuable, and abound in game. The country is more thickly populated than at Nicaragua, the inhabitants being of a much higher order than either the Indians at Nicaragua or the negroes and coolies at Panama.

4th. Facility for the establishment of depots.

Depots could be established on the Panama route either at Colon, at Panama, or at any convenient station along the course of the canal. Troops and matériel could be conveyed either by vessels or by the railroad, which follows the line of the canal very closely. It must be borne in mind, however, that the line of supply for our forces at Panama must be entirely by sea, as no railroad exists through the length of the Isthmus.

The same situation is seen at Nicaragua, except that the line of supply would be much shorter, and the facilities for inland depots greater by reason of the immense basins to be formed and others which now exist.

At Tehuantepec an entirely new and a most important feature enters into the question of Commissariat. Mexico is rapidly pushing forward the construction of a railroad from the Isthmus to the City of Mexico. The Mexican Central Road is now completed through Chihuahua, thus joining with the tremendous net-

work of the United States. With this condition of affairs, the sea will no longer be the only route for supply.

5th. Accommodations for fleets and armies.

In the Bay of Panama and in the enlargements of the canal at that end, will be found ample space for a powerful fleet. At Aspinwall, the bay is entirely open to the full force of the "Northerners," which blow with great violence at certain seasons. The extension of the canal, however, is designed to effect a moderate protection.

At Nicaragua the Atlantic terminus offers greater protection than at Aspinwall, while the harbor of Brito, even when completed, will be small, though well sheltered. The advantages of this nature which characterize the Nicaragua route are given by the immense inland waters on whose surface our little navy could manœuvre in perfect safety. The enlargement of the lower course of the San Juan, the back waters of the same river above Ochoa, and the great lake of Nicaragua would permit the concentration of a hundred vessels.

A serious question arises as to the safety of establishing armies even for a short time along the line of the Panama Canal. We may safely say that an occupation such as the necessity of war would create is practically impossible.

At Nicaragua, troops to protect the line of the canal and to prevent its occupation by the enemy could be easily provided for. Forces, transported in our own vessels, could be established in camps along the line, and strong positions taken in the vicinity of the locks for their protection.

At Tehuantepec there exists no accommodations for fleets; but in this case the line of supply and retreat being by rail through Mexico, the fleet would merely prolong the line of operations and prevent attacks on the termini of the road.

III. Treaty to be entered into regarding the occupation of the canal.

The stipulations made by the countries through which the three routes pass, and conceded to the companies in whose hands the control of the enterprise will remain, are very similar in character, and in the case of the Panama and Nicaragua canals, contain the following regulations in common:

"Provision is made for the neutrality of the waters of the canal and the ports of the termini; and in case of war between other nations, or between one of these and the State in which the canal lies, the transit of the canal shall not be interrupted."

"Provision is made that the entrance of the canal shall be rigorously prohibited to the war vessels of those nations which are at war with another, and whose destination manifests their intention to take part in hostilities."

"Provision is made that the ports of the termini shall not be made a place of rendezvous for hostile war vessels; nor shall supplies be sought there; nor shall prizes be allowed to enter except in cases of distress."

In the case of the Tehuantepec Ship-Railway, it is designed that a treaty shall be entered into between the United States and Mexico, to hold control of the canal, and that the following military provisions be made:

1st. To carry no war vessels or contraband of war of any nation at war with the United States.

2d. To permit free access to the war vessels, troops, and munitions of war, belonging to the United States, under all circumstances whatsoever.

These conditions to be also the privileges of the State of Mexico.

IV. In the case of hostilities with any South American State.

In considering the question of an advanced strategic line, it will be regarded as granted, that the United States will take measures which will secure success to her arms in war, and respectability to her political relations with other powers.

Brazil is the only State in South America whose sea-going navy is superior to our own. In the event of war, her natural military policy would be an immediate attack on our commerce in the West Indies, and the seizure of the Gulf of Mexico.

The great tide of commerce which sweeps from the mouth of the Mississippi into the Gulf of Mexico, seeks from the latter two natural outlets; one by the way of the Florida Straits, the other by the way of the Yucatan channel. It is reasonable to suppose that had we control of the Isthmian Canal or Railway, we would seek to establish the necessary lines of defense leading through these passages. The most advanced line would therefore extend from Key West at the eastern end to the Panama Canal at the southern end, a distance of 1,140 miles. It is now time to discuss the advisability of holding this canal as one extremity of such line.

We have seen that this canal, granting that we have full mili-

tary possession of it, presents the following difficulties as a defensive or offensive point :

1st. It affords throughout its length no inland facilities for the concentration and mutual action of a strong fleet.

2d. The presence of large bodies of troops for its protection would be highly dangerous by reason of the fever scourges which prevail there. As a proof of this we know that in 1885, the most elaborate precautions were necessary to keep in reasonable health the 500 or 600 men sent there by the United States for the protection of the railroad during the Preston Insurrection, lasting but a few weeks. Hardly had the troops been withdrawn than the yellow fever showed itself with unusual violence.

3d. Aspinwall presents no advantages for land defense, and the stormy weather of several months would make the safety of our fleet there a matter of great concern.

4th. Its extreme advanced position and the lack of any convenient point for a base of supplies, would render the place untenable by a blockading fleet.

Compelled, therefore, to fall back from this advanced line, we establish a new one from Key West to the Nicaragua Canal, a distance of 870 miles. The question then is, do the objections urged against the Panama Canal receive the same application here? An examination shows that quite the reverse is the case.

The broad waters of the upper San Juan and the grand extent of Lake Nicaragua afford room for one hundred vessels.

The climate is salubrious, and an army amply capable of a strong defense of the line of the canal would not only be free from the ravages of deadly diseases, but could easily subsist on the plentiful products of the country. In addition to this, the shores of Lake Nicaragua and its islands offer great facilities for the establishment of bases of supplies. The distribution of these supplies along the line of the canal would be the simplest of the problems of Commissariat. At Greytown a commodious harbor will be constructed and the broad waters of the Lower San Juan will protect the fleet against the dangers of the weather, which is less tempestuous here than at Aspinwall. Land defenses for the protection of the harbor could be easily made. The advanced position of Greytown, also, is an element of weakness in this strategic line, but that can be lessened, if not altogether relieved, by means I shall mention later on.

At Tehuantepec rapid concentration is impossible, while the

material of the road could be so destroyed at long range, on the Pacific side, as to disable it.

In view of the requirements which have been deemed necessary for the choice of a strategic line, we find ourselves forced by plain facts to abandon all hope of aid in the possession of either the Panama Canal or the Tehuantepec Ship-Railway. In pursuing this discussion, therefore, we will assume that the reasons for the choice of the Nicaragua Canal as a military base are acceptable and just.

The patrolling of this line would require a large fleet, but we are justified in supposing that the pressure of war will force us into measures which will place us on a tolerably equal footing with our southern adversary.

It is now plain, that by telegraphic communication we are ready to reinforce the guarding fleet at Key West, by the fleet, which sailing from Lake Nicaragua, collects the cruisers on the line of the patrol and falls with irresistible force on the hostile ships making an advance among the islands of the West Indies.

Again, concentration in the other direction would be as easy, and the fleet rapidly crossing the Caribbean and skirting the northeast coast of South America would soon be thundering at the doors at Rio Janeiro.

V. The case of hostilities with any State not in the Western Hemisphere.

Our lamentable naval inferiority to England, France, Italy, Russia, Germany, Spain and Austria, places the question in a more severe light, and the opening of a war with any of them would throw us unquestionably and entirely on the defensive.

It is therefore necessary that we should examine more closely our means to resist an attack against the strategic line, which has been proposed, and to exhaust every precaution to gain from our Isthmian canal all possible advantages.

As has been shown, the eastern outlet of the Mississippi is the Florida Straits. A glance at the map of Southern Florida shows a line of small islands, called the Florida Reefs, which, beginning at Cape Florida, follow the direction of the coast line of the mainland and are prolonged in a westerly direction by the Marquesas Island and the Tortugas Islands for a distance of 220 miles. A distance of 85 miles separates these from the nearest point on the northern coast of Cuba. Turtle harbor, opposite the Bahamas, the harbor between Fort Taylor and the town of

Key West and Dry Tortugas, furnish room and depth for our fleets. In fact, the line connecting Key West with Dry Tortugas forms a strong naval base, besides being the most advanced possible.

At Key West is a naval station, which in time of war the Government could furnish with ample means for the coaling and refitting of vessels. The Fortification Board has given this point careful consideration in its proceedings with a view to any demands of a warlike nature. It is most urgent that this point in our line of defense should be made as strong as possible. Any naval movement by England or Spain would naturally originate in the West Indies, where numerous harbors afford places of rendezvous for their fleets. An advance through Florida Straits should be most strongly resisted, and this could be done only by making these harbors so powerful that should our fleet be unable to stop the first onset of the enemy, it may find safe refuge under the guns of the land forces, where, refitted, and strengthened, it could once more advance to the attack.

Should the vigor and skill of the enemy make this advanced line untenable, let us enquire what should be done for further defense in a more retired position.

The extensive waters of Tampa Bay furnish a new rendezvous for our retiring fleet; and a still more important strategic point would be Pensacola Bay. At each place we have a railroad terminus, while at the latter harbor are ample means for refitting. Its central position renders it extremely valuable for defensive operations; for, situated about 500 miles from the Florida Straits and the Yucatan channel, it could be made the place for the concentration of our fleets, compelled to fall back from Key West on the one hand, and recalled by telegraph from the harbor of Greytown and the line of the canal.

In thus tracing the probable movements of our fleet at Key West, subsequent to an attack by an overwhelming force of the enemy, we must not lose sight of the fact that we still retain our hold on the other end of our advanced line. Indeed, the strength we derive from our possession of the only remaining entrance to the Gulf makes it possible for our naval forces to make a stand at the Florida Straits. Should the waters of the Gulf fall into the hands of the enemy without obliging them to face our fleet at Florida Straits, the latter would be but passive spectators of a rapid advance into the heart of the country. For

the defense of the canal extremity of our line and for the proper employment of the strategic advantages which it gives, these conditions are necessary :

The establishment on the canal of a strong naval base, with a fleet ready to act with forces in the bordering seas. Being connected by telegraph with the naval rendezvous, the fleet could sally forth, join the waiting squadron and fall unexpectedly and with overwhelming force on any point where the enemy may offer weakness or appear insecure. Directed in this way, with promptness and precision, this immense power could be wielded at will at such moments when information of the enemy's condition would make victory absolutely certain.

The movements of the enemy most to be dreaded would be a blockade of either or both ends of the canal, or the occupation of any point on the canal or the destruction of one or more locks. To meet this it would be easy during the time that the danger of war was threatening, to throw an army of 25,000 men along the line of the canal. These could be drawn partly from the regular army and partly from the militia. Three days after embarking at New Orleans they would be landing at Greytown. It is reasonable to suppose that the United States, having determined, when in full possession of the canal, to adopt it as a strategic point, would properly defend the entrances and make provision for the subsistence of a large body of troops which war would call there.

Turrets could be constructed at both ends, mounting powerful modern guns; earthworks could line the shore to prevent the night attacks of landing parties; and submarine mines could be planted and a torpedo fleet and floating batteries be kept inside the jetties. The first lock on the eastern side is far beyond the reach of the guns of the blockading fleet, while that at Brito is dangerously near. To counteract this, the Pacific fleet, though less liable to attack, could be made stronger. Even supposing that these elaborate land fortifications were not constructed, other means for an offensive-defense could be provided, such as dynamite gunboats and numerous small vessels for constantly harassing the enemy and for making night attacks.

With our land forces, the locks, dam, and embankments could be rendered perfectly secure.

These are not chimerical schemes. They but faintly shadow the bold plans that would beyond doubt be adopted by the daring minds that have always come to the surface in our various

struggles. We would need but time to more properly enlarge our resources and call to our aid the never failing plenitude of American ingenuity and pluck.

The extreme advanced position of the Nicaragua Canal must of course place it in a similar danger as that which threatens any salient. To lessen this danger and to provide for the more secure possession of the Isthmus, it would be well to occupy an adjacent naval base, which could furnish such natural security that costly defensive works would be unnecessary.

Chiriqui Lake, 130 miles southeast of Greytown, is just such a point. It is beyond the limit of neutral territory guaranteed by the treaty of 1850, and the extent and depth of its waters, the excellence of its harbors, and the easy control of the outlets to the sea makes its occupation safe and easy. Seventy-five miles across the Isthmus is the Gulf of Dulce, having equal advantages. The acquisition of these points, which were to be connected by a line of railroad, has been urged upon our government, but official action ceased long ago. The ceded rights are easily within our reach to-day, and should the occupation of the canal be an assured fact, the value of this line as an eventual base cannot fail to be recognized. Perfect facilities are afforded here for the construction of a large coaling and supply station, while by means of the railroad, troops can be swung across from bay to bay as the exigencies of the war may require.

It is deemed necessary by the nature of this paper to prove the importance of the Nicaragua Canal as a strategic point of the first order, by pointing out how its disadvantages as an advanced position and as one lacking great natural resources for a strong defense may, in part, be overcome. It is very plain that its advantages are great, both as to position and to its vast inland accommodations for ships and armies, in a war with any naval power weaker than the United States, such as any South American republic.

But were we at war with any first-class Power, holding possessions in the West Indies, such as England, France or Spain, any Isthmian canal would be a source of great weakness; for to hold it would be not only to divide our fighting fleet and to maintain a large army for its protection against raids, but we would cut off these forces from any active part in military operations in the Gulf and Caribbean.

In naval warfare the following maxims are self-evident:

1st. A fleet protecting its own waters must act on the defensive offensive.

2d. A divided fleet, unless largely superior to any force which the enemy can bring into the field, loses its offensive power.

3d. A beaten fleet, driven into harbor, is practically useless, unless the enemy's subsequent operations be very unwise.

4th. A modern fleet must have either a depot for coal or a line of supply, for a coal famine will compel a hurried abandonment of any position, however strong.

5th. A line of supply increases a fleet's danger in proportion to the increased length of such line.

Let us suppose that our enemy be England. Then suppose our fleet to be increased to four times its present size and power. We would still be far outweighed and our discomfiture would be brought about in the following manner:

A magnificent English fleet, convoying its own colliers, passes through the Windward Passage, brushing aside any opposition we might offer there, and establishes an immense coaling station at Kingston, Jamaica, among its own colonists. In the meantime, its look-out ships have given information as to the disposition of our forces. Either we have decided to guard both passages into the Gulf, or to concentrate at one end of our line of defense. In the first case, the enemy divides his forces; the left wing occupying the narrow passage between Jamaica and the Honduras Shoals, thereby cutting off the fleet at Nicaragua from further interest in the proceedings, while the right wing, skirting the northern coast of Cuba, passes into the Gulf through the Florida Straits and compels the concentration of the rest of our fleet either at Tampa Bay or Pensacola. The work of a few days thus opens the mouth of the Mississippi.

In the second case, should we concentrate at Nicaragua, we are lost without a fight; if at Key West, an action may give us the option of running either to New Orleans or to Norfolk.

Should Spain be our adversary, she has the magnificent harbor of Havana in which to assemble a huge fleet and to establish a great depot. Once in full possession here, the whole Gulf is open to her, almost without a struggle. With our present fleet this is possible. We soon hope to be more than a match for Spain, however.

Should France be at war with us, her fleet could concentrate at Guadeloupe and Martinique, where they already have a coaling

station, advance through the Caribbean Sea, containing Nicaragua on the left so as to cover their line of supply, and take possession of the Gulf with ease.

We thus see how miserably unimportant the occupation of the Nicaragua Canal would be in the cases just cited. Even supposing the fleets to be of equal strength, still the possession of Jamaica by England and of Cuba by Spain throws the canal out of the zone of operations.

What situation then is necessary, in order to raise the position of our canal to a strategic point of the first order, under all circumstances?

Let us turn to the map once more.

The large body of water making the Gulf of Mexico and the Caribbean Sea is bordered on the north, west and south by a continuous coast line, and on the east by Florida, the Greater Antilles and the Caribbees. Through this eastern border are the passes of the Florida Straits, the Windward Passage, and numerous other openings through the Caribbee Islands.

Key West, Tortugas and Havana guard the Florida Straits; the first two belonging to the United States, the last to Spain. Havana is a strategic point of remarkable strength, holding, by the position of Cuba, control of the two passes on the north and west. Jamaica, a possession of England, guards the Windward Passage; and Santiago de Cuba the passage along the southern shore of Cuba. Samana Bay, in the independent Island of Hayti covers the Mona Passage, while the other passes are guarded by the French and English bases in the Caribbee Islands.

Should we take military possession of Mugeris Island, where we would find an extensive, though not a well-sheltered anchorage, we, also, would be in a position to close the Yucatan passage, which at this point is 100 miles wide. On the southern coast of Cuba, Cienfuegos is splendidly situated, as a naval base, for the covering of this passage. Granting the strict neutrality of Hayti, we see that Cuba is the key to the entire line from Cape San Antonio to the Mona passage.

With Cuba in our possession would we command the Gulf and Caribbean?

Cuba in a state of defense would be occupied as follows: A large naval base at Havana; a fleet and strong shore defenses, the same at Cienfuegos and Santiago de Cuba, but of the second order and connected with Havana by rail; a sufficient force scattered

along the line of this road, supplemented by patrol ships, to insure its safety. We can, by these vigorous measures, close the Yucatan passage, the Florida Straits and the Windward Passage. What then is the situation of Jamaica? Its nearest base is 930 miles away at Santa Lucia, which in turn is 3,500 miles from home. Jamaica, then, as an advanced position, can be held just so long as the line of supply across the Caribbean is uninterrupted.

Our objective, therefore, would be to throw Jamaica on the defensive, create a coal famine there and thus cause the withdrawal of the forces to their base in the Windward Islands. We thus uncover the canal, which at once assumes the importance of an eventual base with great strategic advantages.

Mona Passage alone remains for the advance of supplies for the enemy. Military control of Samana Bay, with the present insecure state of governmental affairs in Hayti, would be easy. This point gives us every advantage for a base except the willing co-operation of the resources of the country. These must be replaced by strong defenses and large depots.

The French fleet, compelled from the outset, to base on Guadeloupe and Martinique, would be at the mercy of the Caribbean forces. We must understand that this perfect defense is not possible except against inferior, equal or slightly superior forces. Our advantage would be our offensive position at all the important passes, the proximity of our bases, and the aid to be received from the activity of our fast cruisers, torpedo boats and submarine mines. The want of these to an enemy with a distant base, compensates for a small superiority in fighting ships.

Heretofore our efforts to possess Cuba had for their object simply the increase of our commercial interests; now we see in it a positive necessity for our own protection. The importance of the first consideration will be the deciding one in the minds of a peaceful people, who naturally lack the appreciation of a military advantage so far from home. But once annexed, its strategic resources will be speedily turned to account.

The growing interest of the country in the projection of the Nicaragua Canal is undoubted. Already the canal is spoken of as "ours," and those far-seeing and patriotic men who are giving their genius and energy to the proof of its feasibility, and those other, no less Americans, who are supporting it in the financial world, have one ambition in common; and that is, that when their hands shall be loosened from the reins of control, their power shall fall into the safe keeping of our country, ever jealous of her rights, and voicing in her policy the ready assent of all her peoples.

THE USE OF RAILROADS IN WAR.*

GRADUATING ESSAY BY LIEUT. CARL REICHMANN, TWENTY-
FOURTH INFANTRY, AT THE U. S. INFANTRY
AND CAVALRY SCHOOL.

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THE first railroads were constructed as early as the beginning of the second quarter of this century; their lines were short, their machinery, rolling stock, etc., were of the simplest and crudest kind, and their speed and carrying capacity insignificant in comparison with modern railways. Their importance was soon recognized; and after they had undergone important improvements suggested by experience, North America and Europe began to cover themselves with networks of railways. In the development of railway systems the United States outstripped the rest of the world, owing to superior enterprise and mechanical and engineering skill, themselves the fruits of a form of government especially adapted to stimulate private enterprise and competition. This is clearly shown by the following table taken from an anonymous German work on railways, in which the figures express the number of kilometers of railway per million of inhabitants:

	U. S. of Am.	Great Britain.	Germany.	Austria.	France.	Belgium.	Italy.	Russia.
In 1840.....	240	50	21	11	12	83	0.4	0
" 1850.....	525	385	183	57	85	195	23	8
" 1860.....	1570	580	310	141	255	360	80	25
" 1870.....	2300	780	523	270	450	590	233	160
" 1875.....	3034	867	682	482	600	696	274	263
" 1878.....	—	900	753	494	661	758	287	300

The importance of railways for military purposes was not understood during their infancy. Marshal Vaillant is quoted as saying that railroads possessed no military interest whatever;

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and in 1847 a military writer tried to prove that the best organized and equipped railroad would never be able to transport 10,000 infantry over a distance of seventy-five miles in twenty-four hours, and that the transport by rail of cavalry and artillery was out of the question. Experience, however, has taught the contrary; and more than that, it has proved that the offensive and defensive power of a State is enormously increased by railways.

The first use of railways for military purposes in Europe seems to have been made by Austria, in 1850, in concentrating her troops on her northern frontier to overawe Prussia. During the war of 1859 railways were extensively used both by Austria and France. This new feature in warfare attracted general attention, and the continental powers at once applied themselves to its study. In the Danish war of 1864 the troops were transported by rail; but the war was too insignificant to develop new features in the military use of railways. In this war, as in the war of 1859, the railways were not used as a part of the military establishment; and the credit for any work accomplished was due to the railway companies at least as much as to the military administration, if not more.

As we have seen above, the United States outstripped the world in quality and quantity of railway construction; and it was but reasonable to expect that "Yankee ingenuity," which was the first to grasp and appreciate the commercial importance of railways, would, when applied to the new problem, how best to use railways in war, as quickly recognize their military importance, and convert them into powerful weapons for the offensive as well as for the defensive. When the late Civil War broke out in the United States, great roads, such as those on which Napoleon marched his armies in Europe, were rare; the vast theatre of war was thinly settled, and the roads available for the armies were poor country roads, on which it was impossible to bring up the necessary supplies to the troops when at a distance from their depots. Hence, they were bound to the convenient highways of rivers and railways. The latter, owing to their vulnerability and the difficulty of guarding them, invited the enterprises of the enemy; and, as soon as both sides were provided with efficient cavalry, such enterprises became numerous, and they characterized every subsequent campaign. These operations against the enemy's lines of communication differed from those formerly

in vogue, inasmuch as small detachments of cavalry with horse artillery, possessing great mobility, were able to produce the same effect as large bodies of troops formerly did; thus leaving a greater proportion of the troops in front of the enemy. This mode of dealing the enemy a blow was used on the offensive as well as on the defensive. In the Atlanta campaign, we find the Federal army, which was based on Nashville and Chattanooga, and the Confederate army, which was based on Atlanta, facing each other on the Western and Atlantic Railway, which connects Chattanooga and Atlanta. The front of both armies was at right angles to the line of railway, covering the same from an attack in front. General Sherman caused General Johnston to evacuate one strong position after another by threatening or cutting the railway in the rear of Johnston, who tried to stem the Federal advance by destroying the railroads as he retired, and by directing similar enterprises against the railway in Sherman's rear.

This kind of warfare requires a highly efficient cavalry to break the enemy's lines of communication, and an organized body of men, consisting of engineers, mechanics and laborers, all skilled in railroad work, to repair in the shortest time possible any damage wrought by the enemy. For the latter purpose, General McCallum, an architect and engineer, was appointed military superintendent of all the railroads in the United States, with full power to appropriate them, with all their appurtenances, for the public use, and with positive orders to be ready at all times to execute any orders that might be given. He at once organized a strong military administration, centering in his own hand, of the largest system of railways in the world, and created a *quasi* military corps of engineers, skilled mechanics and laborers, for the purpose of operating the lines and repairing damages to them. These two new features, *i. e.*: one military central head of all the railroads, and a special railway corps, proved very successful. Large bodies of troops could, on emergency, be transported over great distances. The command of General Hooker, consisting of the corps of Generals Howard and Slocum, was transported from the Potomac to Nashville, a distance of about 1,200 miles, in seven days, to succor the Federals besieged in Chattanooga by the Confederate General Bragg. The repair of railways could also be effected in a miraculously short time. The Potomac bridge, 400 feet long and about 80 feet high, was rebuilt in nine

days, by two hundred and three men, with the most ordinary tools and of unhewn logs, and withstood a traffic of from ten to twenty heavy railroad trains each way per day. This corps rendered such signal services as to excite the admiration of the world. It has not been equalled in recent wars, and will serve as a model as long as the present system of railways exists.

Abroad, Prussia was the first to avail herself of the experience of our Civil War in this respect. In May, 1866, regulations were issued providing for the organization of railway detachments, in case of mobilization, for the purpose of destroying and repairing railways. When, shortly afterward, the Six Weeks' War broke out, three such detachments were organized. Their nucleus was formed of pioneers from the pioneer battalions, and to this were added civil engineers and skilled mechanics from the personnel of the railway companies. At the end of the war they were disbanded, though they had proven a success. It was thought desirable to have a permanent organization of railway troops, which, trained in time of peace, might surpass the standard reached in the short war of 1866. Before, however, such an organization was formed, the war of 1870 broke out, when five detachments were organized on the system of 1866. In 1871, after the end of the war, a permanent railway battalion was organized, which afterward was enlarged to a regiment of two, later of four battalions. Since then all continental powers have added similar organizations to their standing armies.

What is the difference in warfare before and after the introduction of railways? Formerly armies assembled and executed all their movements by marching. They were largely dependent on the depots in their rear for subsistence and supplies of all kinds brought up by wagon trains; and to keep the depots full required additional wagon trains. Thus the armies were bound to the best roads, and their progress was slow. To-day, when a mobilization takes place, the reserves join their regiments by rail, the army corps concentrate by rail, the depots are fed by means of railways, and no wagon trains are needed except between the front of the army and the foremost depots, which in a well-populated country would not be a great distance. Thus we may say that railroads have partly taken the place of the roads formerly used, and that by the rapidity of transport they have somewhat modified warfare, but not changed its principles.

Railways are constructed to serve as highways for commerce.

This is true for our country. In Europe railways have been constructed where their military purpose was the first consideration. France, since her defeat, has added four lines to her system of railways, for the purpose of facilitating the concentration of troops against Germany. The latter power has built strategical lines to her eastern and western frontiers (and doubled-tracked them) to meet any attacks that might be made. Russia has built a line towards Herat, principally to facilitate military operations there.

In peace time, railroads may answer all the requirements of traffic. The work is one of routine, and when the demands increase, they increase so gradually that they can be easily met. It is different in time of war. Then the demands largely exceed those of the ordinary traffic, and this increase is sudden and must be met at once. Where there are large standing armies, as in Europe, the railways are most severely taxed at the outbreak of a war, and it is evident that the best systematic use of a railway system can only be insured by careful preparation during peace. In this preparation all the different items that make up the capacity of a railroad must be taken into account, and the most important of these will be here discussed:

It is of the highest importance that all the railways which may be used by a country in case of war be of the same gauge, to allow the rolling stock of all the lines of the country to pass everywhere. A difference in gauge would cause delay by the necessity of unloading one train and transferring the load to another. Where there is a difference of gauge of the railways of two hostile countries, it may become a serious matter. It is evident that unless an army invading the enemy's country captures the necessary rolling stock, it cannot use the railways of the invaded district, if there is much difference of gauge between the railways used in the two countries. By such a circumstance the Germans, on their invasion of France in 1870, were much impeded. The gauge of the French railways differing somewhat from the normal gauge used in Germany, German rolling stock and engines could proceed but slowly on French railways. Thus the capture of French rolling stock, and especially of engines, was important. The triple alliance of Germany, Austria and Italy, all use now the normal gauge of four feet eight and one-half inches. The French gauge, as already stated, differs from this; and Russia has, for military reasons, adopted a gauge of five feet—a significant fact. The usefulness of the Russian system is, however, questionable; as by the laying

of an additional line of rails, these railways could be quickly adapted to the use of all rolling stock of both the normal and five-foot gauge, while a narrower gauge cannot be as easily enlarged, for technical reasons.

The rolling stock must be suited to the road; this is best illustrated by an accident mentioned in "Hozier's History of the Six Weeks' War." On the morning of the 5th of August, at four o'clock, the headquarters of the First Prussian Army broke up from Eisgrub, by a short march reached Lundenburg station, and thence by rail to Prague. * * * * Although only one battalion of Jägers formed the escort of the train which brought the Prince and his staff, yet the number of carriages required to convey the whole of the heads of departments * * * * was very great; and on account of the numerous curves in the line, the long train was only able to jolt so slowly along * * * * that it did not arrive at Prague till midnight. Slow and tedious as the journey was, and much as at the time the impatient officers grumbled, they had good cause to be grateful for the tardiness with which it was driven, for the next morning intelligence was received that a train following a few hours after, in trying to go faster, met with a terrible accident. On account of the great amount of military traffic on the line which had lately formed the artery of communication and supplies for the three united Prussian armies, railway carriages had been brought from Saxony and even Prussia to supply the necessary transport. These carriages for the most part ran on three pairs of wheels instead of on two, as do those which in time of peace run along this line, and which for the most part the Austrians drew back with them when they retreated. The Saxon carriages, built for straighter lines and gentler curves, were very liable on such a line as that which from Brünn twists and winds up the valley to Prerau, to run off the rails. It was thus that the accident occurred. One of the six-wheeled carriages flew off the rails, turned over, and formed a barricade, against which and each other the twelve succeeding ones shivered. * * * * This unfortunate accident affords a moral, inasmuch as it shows that not only must the permanent way be entire and safe, but the rolling stock used must be suited to the particular line, if railways are required to afford in time of war not only powerful, but also rapid means of transport."

The number of tracks of a line is also of importance. Where there are two tracks, the outgoing trains can use one track, empty

trains returning by the other. When enough rolling stock can be collected to effect the entire transport without loading trains a second time, and where the places of embarkation and debarkation are so large and numerous that no choking takes place on either terminus by the accumulation of rolling stock, trains can be dispatched at a rapid rate, limited only by the rapidity with which trains can be loaded, engines provided with water and fuel, and by the distance to be observed between trains to prevent accidents. When the required amount of rolling stock cannot be collected and trains have to return for another load, the matter becomes somewhat complicated. Regular traffic requires the return of an empty train for every full one going out. Let us now suppose that a large mass of troops is to be embarked at station A for transport to station S on a single track railway. Supposing the full trains and returning empty trains to cross each other at suitable points, and that the distance between points G and H is greater than between any other two consecutive points of crossing, then a full train requires a certain time to travel from G to H. Before the next train can pass from G to H, an empty train has to pass from H to G. Hence trains must follow each other on such a single track road at no less an interval of time than twice the time required by a train to pass between the two most distant crossing points. In 1870 it was found possible to dispatch twelve trains each way daily on single track lines and eighteen on double track lines. The memoranda substituted at the U. S. Infantry and Cavalry School for pages 22, 23 and 24, of Hamley's "Operations of War," give the following: "Trains should not be dispatched from a station with less interval than ten minutes. * * * 10-16 passenger cars constitute a train and run 20-30 miles per hour. 16-22 freight cars constitute a train and run 15-20 miles per hour."

Schellendorf in his work on the "Duties of the General Staff," says: "In making calculations a mean speed is usually taken which in the case of military trains consisting of 60 carriages and under, may be taken as from $2\frac{1}{2}$ -3 minutes per kilometer, or from 20-25 kilometers ($12\frac{1}{2}$ -15 $\frac{1}{2}$ English miles) per hour. * * * This includes short halts for allowing the engines to drink, etc., and the slackening of speed when passing stations."

Hamley ("Operations of War," page 23) says: "A battalion of infantry standing ready at the station, and properly practiced, entrains in a few minutes. Cavalry requires 25 minutes to fill

the train, and artillery half an hour. If all entrain at the same station, only three trains could be dispatched in an hour."

Cardinal von Widdern, in his work on troop-leading and staff duty, gives 30 minutes for the embarkation of an infantry battalion with all its wagons; for a squadron of cavalry of 150 horses and a battery, 30 minutes to an hour. If the facilities for debarkation are the same as for embarkation, the former will require about one-half of the time which the latter requires.

But all the above figures can only be reached when there are sufficient means for quickly embarking and debarking troops; and this brings us to the subject of stations. Where masses of troops are to be embarked, provisions must be made for loading as many trains simultaneously as possible, in order to have always a loaded train ready to dispatch when the proper interval of time has elapsed since the departure of the previous train. Troops without baggage, horses and wagons, can embark, almost anywhere, and with rapidity; but they carry with them their baggage and ammunition wagons; cavalry in addition have horses; and artillery, guns and horses to load. Neither wagons nor animals can be put on the cars unless there is a ramp leading up to the cars, or a platform is provided on a level with the bottom of the cars. Any one conversant with military matters knows how immense is the amount of these impedimenta even if they are cut down as low as practicable. For example, a German army corps requires at least 92 trains of not less than 50 carriages each, giving the train a length of about 500 yards, more or less; eighteen trains per day loaded and forwarded represent a length of five miles, and it is clear that there are few railway stations giving all the necessary facilities for loading these five miles of trains.

Hence large platforms are erected, giving additional facilities. But it is not only in this respect that few railway stations come up to the sudden demands of war; there must be ample streets giving access to the loading station, and, in addition, a large space where troops, horses and materiel can be accumulated without confusion, to await their turn to embark. The more tracks there are at a station, the more favorable it is for the operation.

These are some of the main points which must be considered where transportation of masses of troops is concerned, and which are clear to any one though not a professional railroad man. It does not require any comment that such transportation is complicated and requires a thorough system. Indeed, the use of rail-

ways in war requires as much system as any other department of the national armory; without it confusion must arise, which at once blocks the lines, and prevents any benefit being derived from them. At the beginning of the Franco-Prussian war the French railway lines were covered with trains carrying provisions and supplies for the army; but a good system was wanting, the lines became choked and thousands of tons of provisions spoiled, and had to be thrown away, while the troops went hungry.

The influence of railways upon the time consumed in mobilizing and concentrating an army, can best be shown by figures, where figures are available. Definite figures in this respect can only be given for the most recent wars: for the wars of Napoleon and Frederick the Great it is difficult to give the exact figures. In those days preparations were secretly commenced long before any hostile intention was manifested; and it requires some historical research to fix the exact dates. After the armies were once mobilized they remained so, to all intents and purposes, for a number of years. The only instance at my disposal is given by Prince Hohenlohe-Ingelfingen in his strategical letters on the Jena campaign. According to his statement, Prussia resolved on war on August 9, 1806, and effected the mobilization and concentration on the theatre of war of about 145,000 men by September 24, 1806, *i. e.*, in forty-five days. But it must be added that this concentration took place within a few marches from the centre of the State. In 1866, Prussia mobilized an army twice as large as the one of 1806 in thirteen days, and concentrated it in eight further days, ready to take the offensive. This achievement was surpassed in 1870, when Germany mobilized an army of 500,000 men in eight days, and in eight days more concentrated about 450,000 on the extreme frontier, much farther from the centre of the State than in 1866.

"In 1866, after mobilization had been ordered by Prussia, on May 3d, the railroads were occupied for thirteen days in carrying the reserve men to their regiments, and preparing rolling stock. The movement of the three armies began May 26th, and on June 5th the armies were concentrated on the frontier of Bohemia. In the twenty-one days allowed 197,000 men, 55,000 horses and 5,300 wagons were transported for distances varying from 120 to 300 miles without failure, and in such a manner that they attained the required spots at the very hour requisite.

"In 1870, when the mobilization was ordered in Germany,

the railways were given up for eight days (July 16-23) to transport the reserves to their regiments. This being completed, the next eight days were occupied in transporting the troops to the frontier. Nine lines were available, six for North German troops, and three for South German. In eight days the first transported 280,000 men an average distance of 350 miles. The concentration of the whole army, 440,000 men and materiel was concluded on August 3d, and the movement across the frontier began on the 4th of August." *

The first battle occurred on August 6th, and within seven weeks after the declaration of war the decisive battles had been fought, while in 1813 the first meeting with the enemy took place nine weeks after the declaration of war, although the troops did not have to traverse such long distances before meeting the enemy. The example of the concentration of the German troops in 1870, teaches also that for such movements through lines are necessary. These carry on a greater traffic in time of peace than small roads, are better provided with rolling stock, have greater facilities for repair, and are altogether more equal to the sudden strain put on them. It must not be inferred from the foregoing, that the Germans owed their ascendancy at the beginning of the war of 1870, simply to the use of railways. The French used railways also; and other things being equal neither party should have gained any relative advantage over the other. The real cause lay in the number of such great lines as above mentioned, and their direction with regard to the theatre of war. The Germans had nine lines against the French four; and a glance at the map will show that those four lines radiated from Paris and diverged more and more as they approached the theatre of war, while the lines used by the Germans came from all parts of the country and converged toward the threatened frontier. Under these circumstances it is not to be wondered at that the concentration, and readiness for the offensive of the Germans was so much more rapid than that of the French. In the days of Napoleon the greater number of good roads gave a superior power of concentration the same as railways do to-day; and this is another proof that railroads have not changed any of the principles of war. It may be said that by railway transport the troops lose the opportunity formerly had of hardening them-

* Taken from memoranda on movements of troops by rail, derived from Greene's "Improvements in the Art of War" (JOURNAL M. S. I., vol. 4), and substituted at U. S. Infantry and Cavalry School for pages 21, 22, 23 of Hamley's "Operations of War."

selves by marching and accustoming themselves to hardship generally; but it must on the other hand be conceded that this disadvantage is certainly balanced by the fact that all men, animals and materiel reach the theatre of war intact, and no longer lose a large percentage from sore feet and other causes.

When two hostile armies are facing each other, one side will usually for reasons of its own, stand on the defensive, while the opponent takes the offensive. The defensive in this case takes up some strategical line from which the offensive will try to dislodge him; this strategical line may or may not be an obstacle. The relative advantages and disadvantages of either side are fully discussed by Hamley (in part V. of *Operations of War*), and need not be gone into here. It is clear, however, that the defender's line can be more easily pierced or turned by either flank when the assailant is in possession of good railways, by means of which he can rapidly move his troops, thereby gaining two elements: *i. e.*, a greater degree of surprise, and concentration of larger forces than would have been possible without railways. His lines once pierced or turned, the defender must for strategical reasons, retire. But there ends the advantage gained by the assailant from railways for the movement of troops, and begins the advantage of the defender, who may retire to a position in rear by means of his railways, and transfer his magazines to a safe place in rear, destroying while retiring the railroads which he uncovers, and thus denying their use temporarily to the enemy. The advantages conferred by railways for strategical purposes are very great; the scattered parts of an army may be rapidly concentrated, a large body of troops may be transferred from one part of the theatre of war to the other, timely succor may be given to threatened points, etc., etc., and the history of late wars is full of examples of this kind.

The first movement of this kind was made in the Italian campaign of 1859, when Canrobert's corps was moved by rail from Ponte Curone to Casale, to aid the Piedmontese troops in covering the flank march of the allied army around the Austrian right.

In the summer of 1863, General Bragg retired before General Rosecrans, leaving the important point of Chattanooga in his opponent's hands. A further retreat of General Bragg would have uncovered the very heart of the Confederacy; and he was promptly reinforced from all parts of the country, among which

reinforcements were five brigades of General Longstreet's corps, which formed part of General Lee's army on the Rappahannock, and which could not have joined him in time at Chickamauga, by marching. When General Rosecrans was defeated in the battle of Chickamauga, and shut up in Chattanooga, all available troops were dispatched to his aid, among them General Hooker's command, which was transferred from the Potomac to Nashville by rail in seven days, a distance of 1,200 miles. These troops contributed largely toward extricating the Federal army from its predicament. General Seymour's expedition from Jacksonville against Tallahassee was brought to a stop, and was finally repulsed, by troops forwarded by rail from Charleston.

After the battle of Weissembourg, on August 4, 1870, General MacMahon ordered the first division of the seventh corps, which was forming around Belfort, to proceed by rail to Hagenau to reinforce his own troops. The infantry of this division arrived in eighteen hours, and participated in the battle at Woerth, which point they would have been unable to reach by marching in less than five or six days.

When, toward the close of the year 1870, Paris was invested by the German troops, several new armies were organized in different parts of France to raise the siege of the capital. The investment of Paris required a large part of the German army, and comparatively small bodies of troops were available to cover the investment by offensive operations against these new French armies. The troops operating against the French North army were dispersed, occupying mainly the cities of Rouen and Amiens, which are connected by a railway. When the French North Army took the offensive, the troops at Amiens were reinforced from Rouen, and thus enabled to repulse the attack of December 23d. The French army then threatened Rouen, when the troops previously sent to Amiens were returned, with additional reinforcements from Amiens; and January 4, 1871, the French under General Roye were defeated. General Faidherbe then, with the main body of the North Army, threatened Amiens, when the troops there were again reinforced from Rouen, and defeated the French. The distance between the two cities is only about sixty miles, and the troops transported were not large bodies; but the operations took place in the midst of an unusually severe winter, and the Germans would not have been able to repulse the North Army without that line of railway.

Many more examples could be cited.

However numerous railways may be on a theatre of war, it will rarely be the case that troops can be moved directly to a field of battle, although some instances have occurred. At the first battle of Bull Run victory was snatched from the Federals, at the eleventh hour, by General Johnston's troops arriving on the field of battle and rolling up the Federal right wing, which was in the air. These Confederate reinforcements had arrived by rail in the vicinity of the battle-field.

On August 6, 1870, the advanced troops of the first German army precipitated themselves into an engagement at Spichern with the French second corps, which was superior in numbers and occupied a strong position. These advanced troops were reinforced by two regiments of infantry and a battery, brought up by rail within reach of the French guns. Without this aid the Germans could not have been successful at that point.

Still more rare are instances where troops are moved from one part of the battle-field to another, owing to the probable absence of such a railway and the insecurity of transportation even if the railway be at hand. It may, however, be practicable in large intrenched camps, such as Paris, having a circular railway running inside of and parallel to the enceinte.

For the defense of a sea-coast railways are of eminent value, as they enable the defender to keep the main body of his troops concentrated at a few points, guarding the coast by small detachments, whose only duty is that of observation. Should a landing be attempted, the defender can concentrate superior forces against the invader and overwhelm him, if he has succeeded in landing, or prevent him from landing altogether. States with large sea-coasts have enormously gained in defensive power from the use of railways; and the United States are particularly fortunate in possessing many railroads, not only such as are parallel to the sea-coast, but also such as lead to the sea-coast from the commercial centres of the interior. These numerous railroads form the only kind of coast defense of the United States to-day. This statement may not be appreciated now, but would surely be in the case of a sudden invasion.

"The effect of railways in modifying the conditions of war is in nothing so important as in the supply of armies."*

The supplies needed by an army are many. In the first place,

* Hamley.

an army must be fed in order to keep it in condition to fight; when it fights, it expends ammunition, and loses a number of men; the clothing and shoes will be worn out; equipments are lost and worn out; and all these items must be immediately replaced to keep the army in proper condition.

The food supply is the most important of these items, and has always been a prime factor in the calculations of commanders. They are restricted in their movements by the necessity of providing food for their troops. The methods of Frederick the Great were very cumbersome in this respect, his troops being entirely fed from magazines, from which he could advance only a certain distance, when he had to halt and establish new magazines before advancing further. The French armies, in the wars resulting from the French Revolution, pursued a different system. They lived on the invaded country by forced contributions, and thereby gained largely in mobility; but for battle they had to concentrate, and then they had to be subsisted from magazines in their rear, and still required open and secure lines of communication with their depots. The roads in their rear were covered with wagon trains, and the matter of supply was still a drag on the movements of the armies. The larger an army, the greater are the difficulty and quantity of supply, and the less is the probability of finding the necessary subsistence on the theatre of war. Hence supplies of food must be brought up from the rear under all circumstances. Formerly this was entirely done by means of wagon trains; but to-day, when an army consists of a million or more of men, it would be impracticable, and railroads are the only means to this end, unless the exceptional case takes place that all the transport of supplies can be effected by water. Railroads also make it possible to draw the subsistence from all parts of the country, thus distributing the burden, and exempting certain small districts from the stress of feeding a large army.

The army investing Paris in 1870 numbered about 200,000 men, and the supplies brought to them from Germany came over a distance of about 250 miles. Under the present system, 150 four-horse and 400 two-horse wagons carry supplies for ten days for 36,000 men in the German army. Had the troops before Paris been entirely provisioned by wagon trains composed as above, it would have required about 825 four-horse wagons and 2,250 two-horse wagons to supply the army for ten days. Supposing the army supplied for ten days, the wagons would require at least fif-

teen days to return for another load and fifteen additional days to rejoin the troops, making in all thirty days, and requiring in all 2,475 four-horse wagons and 6,750 two-horse wagons to keep the army constantly supplied; all this provided that no choking of the roads took place, that no accidents occurred, that the wagons traveled at an average of seventeen miles per day, and that there were enough good roads to facilitate the distribution of these supplies. The cost of this wagon transportation would have been very great. But this is not all; at that time Germany had about 500,000 more men in France, who had to be supplied. In addition to this, the Germans laid siege to eighteen French fortresses; the siege guns, munitions and materiel had to be brought up; and heavy guns were used, which could not have been transported overland, so as to arrive in time, without the use of railways. These armies suffered enormous losses in killed and wounded, and the wounded had to be transported to the rear, etc., etc. In short, if all the transport had had to be effected by ordinary wagons, the amount of transportation required would have been so enormous as to make it questionable whether Germany would have been able to furnish and sustain it. But the use of railroads simplified matters greatly. One train can carry provisions for 36,000 men for two days: and at this rate, six trains per day could feed the whole army assembled before Paris, while a few additional trains could bring up all the necessary materiel. "One line for some time fed the army of 200,000 men, brought up the siege materiel and reinforcements, averaging 2-3,000 men a day, and even, at one time, fed Prince Frederick Charles' army also, with very slight aid from the resources of the exhausted theatre of war."*

A few more statistics—taken from Major Weitzel's extract, from the official account of the same war—will further illustrate the magnitude of the work accomplished by railway transport.

The Germans expended 30,000,000 of rifle cartridges, 363,000 rounds of field artillery, and 500,000 rounds of ammunition for heavy guns; they besieged eighteen French fortresses; as soon as one surrendered, the siege park was transferred by rail, and siege laid to some other place; and sometimes the park was augmented by adding some of the French heavy artillery captured in the fortresses. They also captured and transported to Germany 400,000 prisoners of war, 1,915 field pieces and mitrailleuses,

* Hamley's "Operations of War," page 40, JOURNAL M. S. I., vol. 3.

and 5,526 heavy guns. Without railways it would have been very embarrassing to bring up such quantities of supply, or to bring their captures to a place of safety. In fact, the war would not have been so disastrous to France if railways had not existed; for although it might have assumed similar proportions, yet the progress of the invading armies would have been much slower, giving the French nation an opportunity to retrieve its misfortune. As it was, the railways gave the offensive such a terrible power that in a few months France was entirely vanquished.

While railways thus greatly favor strategy, enabling the offensive to be more aggressive than ever, they are of great benefit to those who have become victims of the war through sickness or wounds. Indeed the tendency to alleviate the sufferings of these victims, has from no other source gained so much material support as from the introduction of railways as an element in war. The masses converging on modern battle-fields for decisive action are enormous; and the number of their sick and wounded is so great that the sanitary organizations are not sufficient in personnel and materiel for more than a very short time. Whatever is wanting in medical supplies, nurses, etc., can quickly be brought up by means of the railways. When the battle has ended in complete disaster to one party, the victor will find the enemy's wounded also thrown on his hands. The towns and villages in the vicinity of a battle-field are overcrowded with wounded, and sanitary considerations require that they be evacuated as soon as possible; as otherwise hospital epidemics may break out and carry off many who would not have succumbed to their wounds alone. This evacuation can be effected with much dispatch by rail. Those less severely wounded are transported to hospitals established in the rear, in passenger coaches if they can sit up, if not, in box cars provided with a layer of straw. This evacuation lessens the danger of epidemics; and, by diminishing the number of patients, allows of those severely wounded receiving more care than could otherwise be the case. Much progress has been made in this use of railways. The Germans in 1870 used two kinds of trains for the removal of their sick and wounded. Those of the lighter class were transported in passenger coaches and box cars. The more severe cases were transported in sanitary trains provided with all the appliances and comforts of a hospital, and so arranged as to spare the patient a painful transfer from the stretcher to the bed in the car, and to exempt him from the

shock of the car in motion. This was done by bringing the patient into the car in the stretcher, which was then either placed upon springs, or suspended from the ceiling. These sanitary trains originated during the late Civil War, and were introduced by Dr. Letterman, the medical director of the Army of the Potomac, who rendered the most eminent services, and brought his department to a state of efficiency not equalled before nor surpassed since.

As railroads may be said to be the very life of modern armies, no small part of the enemy's efforts are directed toward depriving his opponent of these highways. The complete capture of lines of railway will most usually be the result of some strategic combination or decisive battle compelling one party to retire from a certain district. Where armies are limited to one line of railway, as Sherman's and Johnston's armies were in the Georgia campaign, a direct attack on this line of railway in the enemy's rear may form such a strategical combination.

The most common form of offensive railroad warfare is the attack and destruction of railways for the purpose of crippling the enemy. How effective this measure may be, is demonstrated by the failure of General Grant's first campaign against Vicksburg. The Confederate General Van Dorn, with a cavalry force of 3,500 men, destroyed General Grant's depot of supplies, while General Forrest with another cavalry force tore up sixty miles of railway connecting General Grant with his base; the latter being thus compelled to give up the campaign and retire. Again we have seen above that the army of 200,000 men investing Paris in 1870 were dependent for their supplies on a single line of railway. The operations took place in the depth of an unusually severe winter, and the surrounding country was already exhausted. An interruption for any length of time of that single line of railway might have had the most serious consequences.

The mode of attack depends on circumstances. The strength and composition of the force setting out on such an undertaking, and the risk run by them, depend on the relation of the line of railway to be attacked to the enemy's front. When such a line of railway runs along the enemy's front, the detachment is usually a small body of cavalry. As this detachment must elude the enemy's watchfulness and penetrate his lines, secrecy is the first requirement for success, and the smaller the detachment, the better it is adapted to the purpose. Cavalry is used in prefer-

ence to other troops, owing to its greater mobility, it being able to reach the objective point in a shorter time, and to escape pursuit. At the beginning of the Franco-Prussian war, before actual hostilities had commenced, a small detachment of German cavalry blew up a viaduct on the line Hagenau-Saargemines, connecting De Failly's corps at Bitsch with MacMahon at Strassburg. When the latter, on the 6th of August, was attacked at Woerth by the third German army, the reinforcements ordered from Bitsch could not arrive in time. Had railway connection still existed with Bitsch, MacMahon might have drawn to him the whole of De Failly's corps, and been thus enabled to repulse the attack on his strong position.

When the line of railway to be attacked lies in rear of the enemy's flank or centre, a successful operation against it will usually have more serious consequences; but such operations are far more difficult of execution. The detachment has to gain the enemy's rear by a circuitous route; and, arriving there, it will meet numerous detachments of the enemy, which it must be strong enough to brush aside. It must travel with all possible speed, and, after attaining its object, escape the numerous detachments launched in pursuit. Cavalry alone is capable of such undertakings. Indeed, railroad warfare presents a fine field of enterprise, such as the most enthusiastic cavalryman's heart may wish for. Such a detachment will usually consist of several thousand cavalry, with some horse artillery to give it more fighting power, the men as well as the horses being selected for their power of endurance. The late Civil War developed this kind of warfare; from the beginning of 1863, it characterizes all the campaigns, and everywhere appears the tendency to isolate the opponent by cutting his railways. The exploits of the gallant horsemen of both contending parties furnish a standard in this respect to the modern cavalry; and it is with especial pride that we look back upon them. These raids extended over large distances. An example is the raid of Colonel Grierson, who, with one thousand men, marched in sixteen days over 600 miles of hostile country, destroying between fifty and sixty miles of railway and telegraph and a large amount of other property. The vastness of the theatre of war, the sparseness of the population, and, in some cases, the weakness of the garrisons in the invaded district, favored these raids. In the densely populated countries of Europe, raids of such an extent could hardly be expected to meet with success,

the number of railroads and telegraphs and good country roads leaving too large a balance in favor of the raider's opponent. The principle, however, as established, in our Civil War, was promptly imitated, with modifications, by the Germans in the war of 1870. When Paris was invested, the German cavalry divisions were largely, and successfully, employed in destroying any railroads which might be used by the newly forming French armies in combining; and they penetrated far between these new armies, especially toward the south of France.

The defense of railroads is difficult. From their very nature they are so vulnerable that a small detachment can interrupt their operation in a very short time; and the longer their lines are, the easier it is for a raiding party to gain access to and destroy them. When they lie in an invaded district, they are not only exposed to the enterprises of raiding parties, but also to those of guerillas, who, operating in small bands, and having the sympathy of the inhabitants of the invaded district, can act with more secrecy than the large cavalry detachments composed of regular forces. The cases are rare when sufficient troops can be spared from the front to effectively guard a long line of railway. As attacks on railroads are usually directed on those parts which require the longest time for repair, they must be guarded especially. These are bridges, viaducts, tunnels, cuttings and the principal stations. In our late Civil War, which furnishes a prototype to all kinds of railroad warfare, the best means for defending railways were found to be fortifications at the points above mentioned, and readiness to repair, at once, damages wrought by the enemy. Block houses, proof against field artillery, were constructed guarding these points; their garrison consisted of about thirty men, and sometimes they were also provided with artillery. We cannot do better than to quote General McCallum's own words. *

"These attacks on the line to the rear were of such frequent occurrence, and often of so serious a character, that to insure speedy repairs it became necessary to station detachments of the construction corps at various points along the road, and also to collect supplies of construction materials, such as iron, rails, chairs, spikes, cross-ties and bridge timber, at points where they would be comparatively safe and easily obtained when required. These precautionary measures proved to be of the utmost importance

* Report to the Secretary of War.

in keeping the road open. * * * Guerillas and raiding parties were more or less successful in destroying portions of track during the whole time we held this line (Western and Atlantic Railway); but the crowning effort was made by the enemy in October, 1864, when Hood getting to Sherman's rear, threw his whole army on the road—first at Big Shanty and afterward north of Resaca—and destroyed in the aggregate $35\frac{1}{2}$ miles of track and 455 feet (lineal) of bridges, killing and capturing a large number of our men. Fortunately, however, the detachments of the construction corps, which escaped, were so distributed, that even before Hood had left the road, two strong working parties were at work, one on each end of the break at Big Shanty, and this gap of ten miles was closed, and the force ready to move to the great break of twenty-five miles in length north of Resaca as soon as the enemy had left it. The destruction by Hood's army of our depots of supplies compelled us to cut nearly all the cross-ties required to relay this track, and send to a distance for rails. The cross-ties were cut near the line of the road, and many of them carried by hand to the track, as the teams to be furnished for hauling them did not get to work until it was nearly completed. The rails used on the southern end of the break had to be taken up and brought from the railroads south of Atlanta, and those for the northern end were mostly brought from Nashville, nearly two hundred miles distant. Notwithstanding all the disadvantages under which the labor was performed, these twenty-five miles of track were laid, and the trains were running over it in seven and a half days from the time the work was commenced."

The following extract from General McCallum's letter to the New York *Sun*, published June 23, 1878, will serve to illustrate the magnitude of the work accomplished by the railway troops during our Civil War: "As an illustration of the nature and magnitude of the work accomplished in the Military Division of the Mississippi alone, in supplying General Sherman's army, it may be mentioned that there were laid or relaid 433 miles in length of track. There were built or rebuilt over 18 miles in length of bridges. There were in use 260 locomotives and 3,383 cars. There were employed 17,035 men, and the whole expenses reached the enormous sum of \$29,662,781. So much money was surely not spent for nothing. It would not be difficult to multiply examples. * * * A better and more satisfactory idea of the importance of the department and of the actual part it played in

the war, may be gathered from a perusal of the following figures: At one time there were employed in the department 24,964 men. From first to last we operated 2,105 miles of road and made use of 419 locomotives and 6,330 cars. Of bridges we built in all 137,405 lineal feet, or over 26 miles. Of track we laid or rebuilt 641 miles. The expenses of the department are scarcely less suggestive; they reach the high figure of \$42,462,145.55. These figures speak for themselves; they need no comment." Although the devotion of these railway troops contributed a large share toward the final success of the Union forces, yet there is hardly any mention of them in the many and detailed works on the late Civil War. This may be due to the gigantic proportions of the war, causing single items to be lost sight of more or less, and to the fact that the American public is used to see enormous works carried out in short time, especially in the line of railway construction and repair. Nevertheless, the results achieved by these railway troops stand without parallel in the history of war.

We have seen how by the use of railways, large masses of troops can be quickly concentrated, or transferred from one part of the theatre of war to another, giving to strategy a greater field of combination; how easily large armies are supplied, and how generals are largely freed from the care of transporting their wounded, prisoners of war, siege trains, etc. The tendency of railways is to facilitate, to intensify war, and thus to shorten it, if the wars of 1866, 1870 and 1877 on the Continent be accepted as examples.

The successful opening of a campaign will be more than ever a promise of ultimate success, as the successful side can deal its blows in quick succession, never giving the opponent an opportunity to rally.

FORT LEAVENWORTH, KANSAS, April, 1889.

MILITARY TRAINING OF THE REGULAR ARMY OF THE UNITED STATES.*

GRADUATING ESSAY OF LIEUT. WILLIAM P. BURNHAM, SIXTH
INFANTRY, U. S. INF. AND CAV. SCHOOL.

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"Military virtue is not the growth of a day, nor is there any nation so rich and populous that, despising it, can rest secure."—NAPIER.

THE Regular Army of the United States is composed of but a mere handful of men, as compared with the entire military power of the nation. It is, however, the only armed force which is entirely controlled in time of peace by the National Government, and no one can deny the importance of bringing this skeleton of an army to the very highest level of efficiency, that it may creditably perform the duty it owes to the Government, and that it may deserve the continued confidence and support of the people.

The almost complete cessation of hostilities by the Indians in our Western Territories, due to the skill and untiring efforts of our troops, and to the perseverance of bold and hardy pioneers, has opened a new field for the improvement of our small army.

The railroad, that greatest of all civilizers, has penetrated those wild regions, spreading its arms into the mountain strongholds of the hostile bands; towns are rapidly springing up, and the settlers no longer find the soldiers indispensable to their existence. Before the introduction of the railway, troops were necessarily scattered, being located in small camps, so as to be available at any point on short notice; but now that a rapid means of locomotion exists, enabling troops to move or concentrate with great celerity, the necessity for small and isolated

* This essay is one of five recommended for publication by a Board consisting of the Instructors in the Art of War. Priority of publication is not intended to give precedence in merit to any one of the five papers. The Board does not assume responsibility for any of the views expressed by the writers. The topics of the graduating essays are generally restricted to subjects relating to strategy, tactics, and military history; but any important theme relating to military administration or our National military policy is allowed, subject to the approval of the commanding officer of the School.

posts ceases to exist. The training that the troops engaged in these Indian wars received was of inestimable value, as it can never be learned except by actual experience in such hostilities. This seems clear, in view of the fact that it took the combined skill and training of our most noted generals to plan and carry out the campaigns to a successful termination. The hardships endured by the men, often for days without food or drink, struggling along over mountain crags in the deadly heat of Southern Arizona and Mexico, and through all evincing a respect for and devotion to their officers, will be a lasting proof of the merits of the American soldier. But the days of savage warfare in this country are numbered; and now, in time of perfect peace and quiet, should the training of our forces be devoted to their use in modern civilized battles. The first move in this march of improvement should be the concentration of the Army in as large posts as practicable. Recent orders from the War Department and limited appropriations by Congress for the construction of a few such posts, are steps in the right direction, indicating that the value of instruction in time of peace is making itself felt at the seat of our Government.

Granting, then, that the necessity for preparation in time of peace for the exigencies of war exists in the United States, and that Congress will make the necessary appropriations, it remains for the Department of War, through its agents, to map out the course of instruction to be followed. In the pages which follow, my intention is to attempt, in a general way, to point out the course which it is practicable to follow in the future development of our military strength.

PRELIMINARY TRAINING OF THE ENLISTED MAN.

The system of recruiting for the Regular Army is such that a man who is physically unsound in any particular is sure to be rejected. A man may be sound physically, however, and yet be unfit to meet the physical requirements of military service. The average man needs a special training to fit him for the duties of war. Instruction in this very essential part of a soldier's training is in a very pitiable state in our Service; the recruit is simply taught what is known as "setting up drill." This consists of four "exercises," which are intended to loosen the joints, expand the chest, and cause the recruit to stand erect. Even these simple exercises are usually imperfectly utilized, due in a great measure

to faulty instruction. A majority of instructors either omit these movements from their drill, or else confine themselves to causing the recruit to go through the motions with precision and promptness, losing sight of the fact that the exercises are primarily for the physical culture of the individual. But, even when the object of these elementary lessons is attained, much remains to be done to properly prepare the man for service in the field. If there is one thing that is absolutely indispensable in the make up of a soldier, it is a power to march long distances without undue fatigue. Time in war is a prominent factor. Victories are often won or lost by the simple ability or inability of one army to out-march the other, thus rendering mobility a matter of the greatest importance; therefore, in connection with his athletic exercises, the recruit should be taught to walk and run. Much of the time spent in teaching men to go through the manual of arms like a machine should be devoted to instructing them in the effective use of their feet and legs; for a soldier is no longer a machine. When the recruit stands erect without constraint, when his joints are supple, giving him perfect and easy control of his limbs, when on an ordinary road he can march twenty miles in eight consecutive hours without material fatigue, then, and not till then, is he fit physically to meet the requirements of a trained soldier. He next should learn the use of his equipments, particularly his rifle, sabre, revolver, and intrenching tool. Next in order as laid down in our present tactics, he is taught the manual of arms, firings and loadings, and the bayonet exercise. In this respect our tactics are entirely too voluminous, and the system of instruction is defective; too many motions are prescribed, and we require them to be executed with undue exactness and precision. I understand that one of the objections urged against the adoption of the Lee magazine rifle was that the bolt action of the gun militated against the proper execution of support arms. If this objection really had any weight in preventing the adoption of this improved fire-arm, it is indeed alarming; for support arms is unnecessary and should be eliminated from our drill book. All modern continental armies have seen the folly of such a system, and have evinced it in the revised editions of their drill books by abolishing all unnecessary motions and forbidding the introduction of fancy movements. These remarks apply with equal force to our present company and battalion manœuvres; a certain amount of precision is doubtless beneficial in causing the men to pay attention to orders, and thus

discipline their minds to think and act promptly; but in carrying it to extremes, valuable time is wasted which should be given to more important matters. The bayonet exercise as taught in our Service is principally a fancy drill, and benefits the soldier only by giving greater strength to the arms and legs. Beyond this it is of but little real value. This drill should form part of the course training in the gymnasium. The men should be provided with masks and vests, and after the different motions have been mastered they should be paired off so that they will learn the value of each thrust or parry.* The same remarks apply to sabre drill.

Mentally the recruit should be sound, and at least able to read and write the English language. In this respect our recruiting regulations are defective. In this enlightened age of civilization a sufficient number of men with these simple acquirements can certainly be had. I claim as a rule, due largely to the change in modern warfare, that a man who cannot at least read and write the language of the army to which he belongs, has missed his calling. The modern soldier has so much to learn that it is manifestly wrong to enlist a man on whom it is necessary to waste time by being compelled to teach him how to read and write. The recruit should early in his career learn that the first duty of a soldier is a prompt and cheerful obedience of orders. To obey must become second nature to him. He should fully comprehend the meaning of the Articles of War, the obligation of his oath, and his duty to the Flag. It should be instilled into his youthful mind that there is no such word as "can't" in a soldier's vocabulary. Too much attention cannot be given to the matter of respect for superiors. In our service one of the main causes which is detrimental to the early discipline of the men is the fact that the line between the private and non-commissioned officer is not sufficiently marked, and I am confident that in another war it will make itself felt much more forcibly than we are now disposed to admit.

Von Scheff says, in speaking of the battles of the Franco-German War: "The noise of a close conflict between breech-loader and breech-loader is so great that part of the men cannot hear the

* "The present system of bayonet instruction is about as valuable as would be an attempt to teach boxing by having pupils practice the various parries and counters against empty air, without even the benefit of lucid explanation as to their objects." Lieut. A. L. Wagner, 6th Infantry, in "Deductions from New German Drill Book."

word of command." Much must therefore be left to the non-commissioned officers. In fact, the New German Drill Book provides for group leaders who are non-commissioned officers, who take charge of small groups which are out of the immediate charge of their officers. If the men are lacking in respect and obedience to their non-commissioned officers in time of peace, is it reasonable to suppose that they will respect and obey them on the field of battle?* It must be remembered, however, that it takes time and long training to teach a man the true meaning of military discipline. In this connection the words of Lieut. A. C. Sharpe, 22d Infantry, in his article on "Training at Colleges," are well worth noting. "Discipline cannot be drilled into a recruit in an hour or a day, but must be the gradual growth of his military career."

The present method of keeping recruits at recruiting depots for the period of four months after enlistment appears to meet with the general approval of the Service. By many, however, it is contended that every man should be instructed from the beginning by the officers of the company of which he is eventually to become a permanent member; but both methods have received a fair trial, and the weight of opinion supports the present system of keeping recruits for infantry and artillery at David's Island, N. Y. H., and Columbus Barracks, Ohio, for four months, and cavalry recruits at Jefferson Barracks, Mo., for the same period; the idea being to impart preliminary instruction at these points, accustom the recruit to his duties, and give him an idea of what will be expected of him when he joins a company. In the four months spent at these points the recruit should receive the instruction pointed out in the foregoing pages. The cavalry recruit should be taught to ride and care for a horse in connection with his other training. The artillery recruit can just as well take the same course as the infantry for this short period. In my opinion, however, the better system would be to send the recruit to a company as soon as practicable, that he may begin his new calling in the organization to which he is permanently to belong. The only real value of the present system is perhaps the saving of a small sum of money in the cases of dissatisfied men who desert during

* An increase in the pay of non-commissioned officers, together with a separate sleeping apartment and mess for them in each company, would remedy this defect to a great extent, and improve the general discipline and control of a company. An increase in their privileges is also a remedy and comes within the power of the company commander, as well as do the arrangements for sleeping and messing.

the first four months of service. The argument that time is saved the companies by giving the recruit a preliminary training at the depots is more apparent than real, for there is scarcely a single month of the year that the non-commissioned officers of a company are not engaged in drilling some raw recruit enlisted at or near the station of the company, and it is more instructive to the individual man (and decidedly easier for the drill-master) if he can be drilled in a small squad than if he is compelled to learn the drill alone. Still, if the present recruiting depots are to be a permanent feature, steps should at once be taken which would lead to the erection of a gymnasium at each depot, in order that the recruit may have increased exercises for his physical development.

THE COMPANY.

The recruit, after satisfactory advancement has been made, now passes to the company, where he is to complete his training as a soldier.

The captain is responsible for the appearance, discipline, and instruction of his company, and therefore should be given as complete control of it as possible. In the minor breaches of regulations, especially in the cases of young and inexperienced soldiers, he should be authorized to warn the offender, or to inflict some slight punishment according to circumstances. A simple warning will often be sufficient, while to put the young man in the guard-house with criminals is not only detrimental to discipline, but often changes the careless boy into the confirmed offender.

Among the first lessons that the young soldier should study, after he is through with his first exercises, is his duty as a guard or sentinel, each company being provided with pamphlets containing the general orders of guards and sentinels, and the existing special orders of the Post which concern guards and sentinels. A non-commissioned officer should be detailed to instruct the new men in these duties, both theoretically and practically, and they should never be detailed for guard duty until they show a good knowledge of the duties pertaining thereto. No man can reasonably or justly be held responsible for his failure to perform guard duty properly if he has had no instruction prior to the day he "marches on." Each man should not only take his turn as "room orderly," "cook's police," etc., but he should also be detailed as "second cook," at least, for a period of thirty days, that he may learn how to cook his own food in case of need, and to act

as a check against men who are disposed to complain of the cooking if one set of cooks is kept constantly on duty in the kitchen.

The greatest attention should be paid to the cleanliness of the men, compelling them to bathe at least once a week, and they should present a neat and soldierly appearance at meals as well as at parades and inspections.

DRILLS.

Our present drill book was compiled shortly after the Civil War, and, as a consequence, it is unsuited to the requirements of modern warfare. The new book which a Tactical Board is now preparing will doubtless give us the most recent improvements in battle tactics. We shall have two kinds of drill in future—manœuvre tactics and battle tactics; the former consisting mostly of a few simple movements, in more or less closed formations; the latter of open order movements, which will be used under fire, or in the immediate vicinity of the enemy. The importance of teaching the men the difference between the two drills, when and why each should be employed cannot be overestimated.

MANŒUVRE TACTICS.

No unnecessary or fancy movements should be allowed to creep into these drills. Being used at a time when not in immediate contact with the enemy, these movements will be used principally in executing the strategical part of a campaign. They should be confined to a few simple movements which the men should learn to execute with precision and with great rapidity.

BATTLE TACTICS.

To keep men in hand under fire is the most difficult problem in the military art, and can only be solved by the most careful training of the men, on the practice field, in the movements that they will have to make on the actual battle field.

FIRE TACTICS.

Training in this essential part of the soldier's usefulness should properly be given under three distinct heads and in the following order:

1st. *Sighting Drills*, which will include firing reduced charges at correspondingly short distances, or gallery practice, as is laid down in our book on "Small Arms Practice."

2d. *Target Practice* proper, which includes firing at known distances up to 800 yards with the Service charge.

3d. *Practical Field Firing*, which includes careful and constant instruction in estimating distances.

Blunt's revised edition on Small Arms Practice is progressive and an improvement on the older system, but in some respects it is still defective; it continues to lay too much stress on the value of individual accuracy, and is not sufficiently explicit or exacting in regard to firing at unknown distances; and right here is the chief defect in our rifle firing. We lead the world in the accuracy of our firing at known distances, and make phenomenal records at skirmish practice; but it must be conceded that a majority of our company skirmish records could not be approached, if the practice were had on *unknown ground, or on ranges where the distances were actually unknown*. Take almost any company in the Service which averaged over fifty per cent. at skirmish practice last season, and give the same company the practice over ground *absolutely unknown*, and I venture to predict that it will not approximate to any such percentage. Put the men in "light" or "heavy" marching order, encumbered with equipments, as they would be on the battle-field, and the percentage of hits will be still further reduced. This is indeed a vital defect in our system of fire tactics, and can only be remedied by carefully instructing the men in *estimating distances*, and causing them to fire over unknown ranges, as they would have to do in an engagement with an enemy. It is presumed that our new drill book will lay down the present methods of attack and defense, amount of ammunition each man will have to fire, etc., and it will be in accordance with these new principles that we must instruct our men in practical field firing. It will doubtless be found that in an attack of a position each man will often fire one hundred rounds, not twenty; and that at some halts he will fire one round, while at others twenty rounds will be expended. We must make practice in peace conform as nearly as possible to what it necessarily will be on the field of battle, and to do this will necessitate *almost a complete revolution in our present method of skirmish firing*.

SCHOOLS FOR ENLISTED MEN.

As I have before remarked, no man should be enlisted in the Regular Army who cannot at least read and write the English language. As our present recruiting regulations require no such

qualification, it naturally follows that we recruit a great many men with little or no education. While I am willing to admit that we occasionally find a man who makes a good duty soldier without ever learning to read or write, such is the exception and not the rule. Cervantes says: "None make better soldiers than those who are transplanted from the region of letters to the field of war; never scholar became soldier that was not a good and brave man." This remark is particularly a true one at the present time, when the marked changes in warfare are complicating the duties of the individual soldier in an unusual degree. General Orders No. 9, 1889, A. G. O., requires the establishment of schools at every post in the Army for the theoretical instruction of men in their first enlistment, and such young men in their second enlistment as may require instruction, and grants the privileges of these schools to older soldiers who may desire to take advantage of them. Attendance is compulsory upon men in their first enlistment, as such instruction is regarded as a military duty. The evident design is in future to give every man in the Army a fair education and to increase the general intelligence and efficiency of the average enlisted man. That such a course properly carried out will accomplish its end is not to be questioned.

Whether the carrying of the *compulsory* part of this instruction beyond a certain point would be to the interest of the Service or not, is a question which seems to demand consideration. When every enlisted man in the Army can read and write the English language correctly, and evinces a good knowledge of the fundamental rules of arithmetic, including common and decimal fractions, we will have an enlisted force possessing sufficient intelligence in that direction to meet the requirements of a modern army; and as the Army cannot be expected to become a public educator, and as the young soldier has much other important work to learn, it scarcely seems advisable to push him too far at the possible liability of falling short in his other military training. If he desires, as many will, to advance further, and time can be spared from other duties, he should be encouraged to do so. Again, among the men in our Army are to be found a great many who naturally dislike books and study, while these very men are often the most efficient and practical soldiers we have. To *compel* such men to learn more than is laid down as essential for the *average soldier* will be sure to cause serious trouble and discontentment in the ranks.

Non-commissioned officers require a special course of theoretical training, in addition to that laid down for the average enlisted man. In the proper performance of his office as a sub-leader, the non-commissioned officer must become thoroughly familiar with Tactics, Duties of Guards and Sentinels, Outposts, Pickets, Flankers and Reconnoitering Parties. He must not only understand these duties himself, but must be capable of imparting this knowledge to his subordinates, and by his superior intelligence command and deserve the respect and obedience of the men under his control. He should even be capable of doing an officer's work; for on the battle-field it will often happen that senior non-commissioned officers will find themselves actually in command of companies, corporals in command of platoons, and so on; and it is at this juncture that the previous military training of the rank and file doubly repays the Nation that has given it due attention.

FIELD MANŒUVRES.

The foregoing pages have been devoted almost entirely to the theoretical and preliminary instruction of the soldier; much of which can only be imparted in permanent posts or camps. I have purposely omitted to speak of the training of larger formations than the company; for so far as the enlisted man is concerned, if he is thoroughly instructed in his duties in the company, he has practically nothing to learn, so far as his individual action goes, to enable him to do his duty when his company forms a part of a larger organization. As soon as time and weather permit he should learn the duties of outposts, pickets and patrols, which can just as well be taught in the vicinity of any military post. The duties of advanced guards, rear-guards, and flankers can also be learned at this period, thus saving much valuable time when troops are sent out on their yearly practice marches. To give more time and men to perform the numerous duties which have been outlined as practicable to learn in the permanent post, I would do away with at least one-half of the life-shortening and unnecessary post guard duty which is exacted of the enlisted man at most of our garrisons. I would substitute for it a system of policemen or patrols similar to that employed in our large cities. I would arm sentinels in charge of prisoners with rapid firing shot-guns, similar to those in use at the Military Prison, thus reducing the guards by placing more prisoners in charge of a single sentry.

Under the head of "Field Manœuvres" the most essential and practical training of the soldier will be learned on the yearly practice marches and camps. It is at this period that he will put in practice his theoretical knowledge, and practically perform the services required to enable him to cope successfully with the exigencies of actual war.

In the past few years it has been the custom in our Service, wherever practicable, to send troops on practice marches and remain in summer camps for short periods. It is now proposed to establish larger camps of instruction, by combining the available troops in several garrisons, so that manœuvres on a larger scale can be practiced; and some of the Departments have already convened boards of experienced officers to recommend programmes of instruction. The proceedings of these boards will doubtless be published in the near future. To reap a full measure of benefit from these marches and camps, they must be conducted solely on one principle—the performance of every movement as if in the presence of the enemy.

To march a column along an ordinary road without flankers, advanced or rear guards simply tests or increases the marching powers of the organization (a very valuable exercise), but fails to instruct them in the proper method of marching in the vicinity of a foe. The men should invariably be equipped in "heavy marching order," carrying every article that they require in actual war; and, upon arrival in camp, the pickets and outposts should be regularly posted, and, if practicable, hasty intrenchments thrown up. The length of a day's march, the rate of marching, and the details of conducting these journeys are too well known to require repetition. It is to be observed, however, that some commanding officers are prone to adhere too closely to the old rule of marching a column fifty minutes and halting ten. It has been my experience that marching up a grade of one in five for fifty minutes is unnecessarily fatiguing and in the end no time is gained by it. A man is surely no stronger than a horse, yet attempt to compel a horse to draw a load up such slopes for fifty minutes, without letting him stop for breath, and one of two things will result; either the horse will balk, or when you reach the summit he will be "played out." On the other hand, I find that men march easier early in the day, and do not feel the need of rest oftener than twice in the first three hours, the road of course being a good one.

SUMMER CAMPS.

These camps of instruction should, if possible, be located in a region which admits of the free movement of large bodies of troops; such as the rolling plains of Kansas, where the folds of the ground will conceal cavalry from view, and offer shelter for artillery. The troops in each camp should be composed, if practicable, of infantry, cavalry and artillery, and such engineers as can be had, in order that the different arms may learn their duties when acting in concert. However, until we get a new and modern system of battle tactics, it seems clearly a waste of time to use our old system and continue to teach men tactics that will never be used again. Still our Army will learn many valuable things in these camps. All duty should be performed as if in the immediate vicinity of an enemy, hasty intrenchments thrown up, field works constructed, reconnoitering and scouting parties sent out, bridges thrown, and careful instruction given as to the best method of taking care of one's health, for a sick man is quite as useless as a wounded man, and in case of battle is worse than a dead man. The similitude of actual warfare should be made as great as possible, that the men may be hardened and know what will be expected of them when they are called on to take the field.

TRAINING OF OFFICERS.

The Regular Army is the only body of professional soldiers in the United States: and as such it is the guardian of the peace and honor of the most intelligent and progressive nation on earth. In time of peace it is looked upon by State troops as an ideal military organization, complete and perfect in all its parts, and as the standard with which they compare their own military proficiency.

In time of war, the country will expect it to be ready to take the field and be the brains and back-bone of the Nation's military strength.

The profession of Arms has become so complicated and extended of recent years that it requires continual study to keep abreast of the "ever-changing and never ending Art and Science of War."

It is now impossible for the ordinary man in civil life to give this matter sufficient attention, and it therefore becomes doubly necessary that the officers of the Regular Army should devote their entire time to their profession, that they may be "equal to the occasion" at all times and in all places.

For the purpose of discussing their training, the officers of the Regular Army can very properly be classified as follows:

- 1st. Appointments from the U. S. Military Academy.
- 2d. Appointments from the ranks.
- 3d. Appointments from civil life.

Generals are born, not made. You can train and teach men with average ability till they become efficient officers, but the Almighty must specially endow such men as Napoleon and Grant. A model brigade or division commander often becomes a total failure as the leader of a corps or of an army. Yet training and experience will add greatly to the natural abilities of any man.

GRADUATES OF THE MILITARY ACADEMY.

The course of instruction at the United States Military Academy is doubtless equal to that of any similar institution in the world.

The aim of the Military Academy is, first, to ascertain as quickly as possible whether a cadet is capable of becoming an efficient officer at all; next, to instruct all cadets in such a manner as to give each a knowledge of the general requirements of all arms of the Service; lastly, to determine the particular arm of the Service best suited to the ability and attainments of each cadet. In other words, before graduation they should be "sized up," so as not to get the triangular man into the round hole. In this respect I think there is considerable room for improvement on the methods now employed to determine this point. At present each graduate chooses his arm of the Service according to his class standing, and this, in short, is mainly the measure of his brains as a mathematician. It is doubtless the best method of selecting officers for the Engineer and Ordnance Corps, but to select men for the line of the Army according to their theoretical knowledge of mathematics, or to decide that a man is unfit to be an officer at all, simply because his mathematical ability appears not to be above the average, is of doubtful expediency, and the system should be remedied. It is an easy matter to select men for the non-combatant corps in the Service, for they can justly be selected for their theoretical knowledge; and it is equally easy to determine in which arm of the line of the Army a man will do the best service, if you go the right way about it. For infantry or cavalry an officer should possess a good average brain, an eye for localities, a mind that takes in a situation at a glance, and,

most important and essential of all, good common sense. A line officer devoid of good practical judgment would be quite as much a failure as an engineer officer devoid of a knowledge of mathematics. If instructors could come more in personal contact with cadets, and watch their characteristics, they could in a measure tell the practical, "go-ahead" cadet from the slow, theoretical plodder.

The instructor in cavalry drill can, even now, pick out the best riders in a class, and tell what cadets hold on with their heels, or who are afraid of a horse. Men of this latter class will seldom make good cavalry officers, yet can it be denied that a majority of these very cadets are assigned to that arm of the Service on account of their high standing in *mathematics*, or theoretical knowledge? This is a very striking illustration of the defect in the method of assigning graduates to the Army. The system of instruction seems to have gotten into a theoretical rut, to the detriment of much practical work which should be done at the Academy. Numerous showy drills and "circus performances" in the riding hall, the course in Spanish, the study of a book called "English Lessons for English People,"* and many of the puzzles in higher mathematics, which are "more peculiar than valuable," should be abolished. The time thus gained could very profitably be utilized in more extended and practical instruction in Art and Science of War, and in Surveying and Topography.

As a class, better equestrians than the graduates of the Military Academy do not issue from any institution on the globe, but a good circus rider is far from being a good cavalryman. Unless he knew it before entering the Academy, the graduate is almost totally ignorant of the power or capabilities of a horse. Many a man graduates, and does not know whether a horse should eat ten or forty pounds of grain a day; whether it is wise to ride him thirty or ninety miles in the same period. All of this remains for him to learn after he has entered the Army as an officer; for every officer of the line must know, sooner or later, all that pertains to the care and handling of the horse; and if he does not have this information when he joins, he is likely to be very much embarrassed on finding himself in command of a troop of cavalry, or a wagon train, *in the field*, and entirely at the mercy of enlisted men regarding his duties.

* The other text books in the course in English are excellent, and should be retained.

Every graduate should at least know the general principles which govern the use of the different arms of the Service, so that he may know the duties of his own arm when acting in concert with the others on the field of battle. After graduating, all should serve a year with their respective commands, when those belonging to the Engineer Corps should be detailed for the course of instruction at the Engineer School, those in the Artillery to the Artillery School, and those in Cavalry and Infantry to the Infantry and Cavalry School, in order that each may receive additional information regarding the particular branch of the Service to which he belongs. To make this idea practicable, would necessitate the detailing of two officers instead of one to take the prescribed courses at these institutions, which, of course, would be a simple matter. In this way every officer of the Army would reap the benefits to be derived from these valuable bridges on the rugged road to military fame.

APPOINTMENTS FROM THE RANKS.

Existing laws and regulations provide for the promotion of meritorious non-commissioned officers to the grade of second-lieutenant. In substance the manner of obtaining a commission in this way is as follows: The applicant first receives the recommendation of his company commander, which being approved by the regimental commander, is forwarded to the department commander, who convenes a board of officers to examine the applicant, according to existing orders; if found proficient by this board, he should receive his commission, if a vacancy exists. To be eligible for examination, he must not be over thirty years of age, not married, must have served at least two years in the Army and be a non-commissioned officer at the time of his examination. His examination should show a good moral character, and a good knowledge of arithmetic, English grammar, geography, history, (especially of the United States) reading, writing, spelling and Constitutional and international law. While it cannot be denied that the Army has received a great many valuable and intelligent officers from this source, it must be admitted that some have been promoted whose mental calibre and general characteristics are below the standard of the average army officer. It is very easy to conceive how such men might receive promotion if they simply possessed the above qualifications; but it is a mystery why any company commander should deprive himself of an excellent com-

pany clerk to give the Service an inferior second-lieutenant. It is apparent that the present mental requirements, especially in time of peace, are entirely too limited. Practically, they are the same studies in which a candidate is examined to *enter* the Military Academy. Surely two years' experience and training as an enlisted man does not compare with four years' study and training at the Academy. The result of this low standard is beginning to make itself sorely felt, especially in the after-training of the young officer. Either these young men must be placed in a separate class after they are promoted, and receive a special and extended course of instruction to place them on a level with the young graduate, or else, as is now the custom, the other method having proved impracticable, they must be placed side by side with the graduate, and required to pursue the same course of study. The result of this is, that the course of study must be suited to the mental qualifications of one or the other class of officers. In one case, the graduate receives beneficial and additional knowledge, and the officer from the ranks is unjustly found deficient. In the other case, the man from the ranks receives valuable knowledge, while the graduate wastes his time by learning nothing. In this age of rapid military advancement, it is evident that the proper solution of this problem is immediately to make the examination of a non-commissioned officer for promotion such that when he receives his commission he will be qualified to *pursue intelligently* the study of the duties of his new office.

To accomplish this result, in addition to present requirements, a successful candidate should possess a good knowledge of military law, algebra, geometry, trigonometry, and the tactics of the arm of the Service to which he belongs. He should also serve in the Army at least three years instead of two. I am of the opinion that some minor alterations in the manner of selecting and examining non-commissioned officers for promotion would be advisable. The original recommendation should doubtless come from the company commander, but the regimental commander should be authorized to convene a board of regimental officers, whose duty should be to inquire into the qualifications of the applicant, and forward their opinions to the regimental commander for his guidance. This board, consisting of three or more officers, if practicable, should be composed of officers serving at the same station as the applicant. All papers relating to the case should then be forwarded by the regimental

commander, through regular military channels, to the War Department. The Secretary of War should then, each year, convene a board of officers at Fort Leavenworth, Kansas, the duty of which should be to make a thorough examination, in the studies mentioned, of all applicants for promotion, much the same as is now done in the case of department boards. This board should consist of at least five members, and all arms of the *line* of the Army should be represented. One of the members should be a medical officer, whose duty should be to investigate the physical qualifications of the candidates. The recommendations of this board should be final; and if practicable the board should examine all non-commissioned officers and civilians who are recommended for appointment to the grade of second-lieutenant during the year; thus enabling it to determine the relative standing of the successful candidates. It is to be understood, of course, that meritorious non-commissioned officers recommended for promotion have gone through the training already prescribed for the enlisted man, and that they are proficient in all that pertains to the duties of a soldier. The fact that an applicant has, for a considerable portion of his service, been on extra or daily duty in one or more of the Staff departments, or been on duty as overseer of a post school, is no reason for inferring that he is not proficient in the ordinary duties of the enlisted man. On the contrary, the fact that he has shown himself to be competent and intelligent in the performance of duties in these departments, should be greatly to his credit. The first year of any soldier's service should doubtless be devoted wholly to his duties as a private soldier; and no soldier should be detailed for any other duty during this period, especially if he has had no previous military training. But I claim that any young man who possesses sufficient intelligence to become an officer, and who is desirous of doing so, can learn all that pertains to the duties of an enlisted man within a year. At the end of this period, he should be eligible for promotion to the grade of non-commissioned officer, and during the two succeeding years he should not only learn his duty as a non-commissioned officer, but should be *compelled* to make himself familiar with work pertaining to the offices of first-sergeant, sergeant-major, post quartermaster-sergeant, and commissary-sergeant.

Great responsibility rests on the shoulders of a captain who recommends a man for promotion, as the interests of the Service

are of primary importance, and not those of the captain or applicant.

APPOINTMENTS FROM CIVIL LIFE.

The law authorizes the appointment of civilians as officers in the Army, and their examination is of about the same extent as the one at present laid down for meritorious non-commissioned officers. What has just been said regarding the qualifications and examinations of enlisted men for promotion applies with equal force to this class of applicants. For obvious reasons, the examinations should be identical, and conducted by the same board of officers that examines meritorious non-commissioned officers. The Adjutant-General of the Army has recently made a very praiseworthy recommendation in respect to this class of appointments. It is to provide that appointments from civil life be selected from meritorious and efficient young officers of the National Guard. This would tend to increase the efficiency of State troops, and at the same time be of inestimable value to the Army, by giving us a class of intelligent and partly trained soldiers, and soldering the bond of union and good feeling between the National and State troops.

Officers appointed from the ranks and from civil life, as in the cases of graduates from the Military Academy, should after a year of service with their regiments be sent for a course of instruction to the school which belongs to their respective arms of the Service.

OFFICERS' SCHOOLS.

Referring to our Civil War, in a letter dated Washington, August, 15, 1861, General McClellan writes: "The great trouble is the want of officers of regiments. We have good material, but no officers."

I have in the foregoing pages suggested the expediency of sending every graduate of the Military Academy, and every officer appointed from the ranks or from civil life, after one or two years' service with their regiments, to one of the three schools of officers. I have also pointed out the consequent necessity of enlarging the school at Fort Leavenworth by detailing two lieutenants from each regiment every two years, instead of one as is now authorized. These changes are all within the power of the War Department, and in view of the constantly increasing demands for intelligence and experience on the part of the modern soldier in all that pertains to a profession so bound-

less in extent, it seems eminently to the interests of the Service that every proper means should be employed to increase his efficiency.

Pertinent to this subject of the training of officers, Lieut. A. L. Wagner, 6th Infantry, makes some valuable remarks in his Prize Essay on the "Military Necessities of the United States," written in 1883 for the JOURNAL OF THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES. He says: "Further military instruction should be provided for the militia by permitting a limited number of officers of the Reserve to enter the school of application at Fort Leavenworth. Thirty young militia officers, apportioned among States, or groups of States, as college details are, might be educated at the Infantry and Cavalry School with almost no expense to the United States." He then gives in detail a very lucid and practicable system of selecting these officers, and points out the value of such a system to the military forces of the Nation. I see no reason why this idea has not materialized, except that legislation is necessary to give it effect. It is to be hoped that this novel, but perfectly practicable, suggestion for promoting and spreading military knowledge throughout the United States may meet with the favorable consideration of Congress.

The schools for officers of the Regular Army are the Engineer School, the Artillery School, and the Infantry and Cavalry School. It seems scarcely necessary to state in detail the various workings of these institutions, and I shall simply point out in a general way the ground that they cover, and my ideas in respect thereto.

It is reasonable to suppose, and it is also a fact, that the name of each school indicates the predominating feature in its course of instruction and training. As a rule, the methods of instruction and course of study in each are suitable and effective, fulfilling the objects for which the schools were created. Of course they are not perfect, but they are constantly improving, and all appear alive to changes that are constantly occurring in modern warfare, and are enlarging or changing their courses of instruction accordingly. The Engineer and Artillery Schools have been in operation for a considerable period, and being duly recognized by Congress, rest on a perfectly secure basis, and are all that is to be desired. The Light Artillery still needs a school, which is, however, now being established at Fort Riley, Kansas.

The Infantry and Cavalry School at Fort Leavenworth is of

recent origin, having now been in operation for only eight years. Although it is the representative institution of the Infantry and Cavalry, and therefore supposed to instruct *three-fourths* of the officers of the Army, as yet it has not been officially recognized by Congress, and hence has had an up-hill road and a hard struggle for continued existence. Due to the tireless energy and military zeal of its officials, under such adverse circumstances, it now has a solid foundation, and seems destined to bear excellent fruit. There is still room for improvement, however, but such improvement can be had without legislation, and it is therefore simply a matter of a few years for it to become perfect in all its parts.

It is clear that the methods of instruction at all of these institutions should be such as to impress upon the minds of the young student-officers that they are not regarded as schoolboys, but that they are men, and having reached years of discretion, are expected to see the importance of devotion of time to the study of their profession, and to learn to regard it not only as a duty but as a pleasure. In view of the limited time that each officer can spend at these schools, it is manifestly proper that no duty should be required of him which he *must necessarily* learn at the station of his company, and he should therefore be exempt from all routine garrison duty, thus enabling him to devote his entire time and energy to the pursuit of knowledge that he cannot easily acquire except at the school.

For similar reasons instructors should also be exempt from such duties. It must be conceded, however, that so long as instructors are detailed from the posts at which the schools are located, the students must be required to share the ordinary post duties.

It would be very desirable, however, to have instructors detailed by War Department orders; thus securing officers especially fitted for this kind of work, and enabling them to give their undivided attention and energy to their duty as instructors.

Instruction in practical military surveying and topography should be a feature common to all Army schools, as it is a military necessity, and a prominent factor in the education of every officer. A general without a map of the theatre of war is like a ship on a stormy ocean without a rudder; and as such maps are not always to be had at the breaking out of hostilities, officers should at once be available to move into the theatre of operations and rapidly execute topographical sketches and reports for the in-

formation and guidance of commanding generals. Accuracy in a military map is of vital importance, the mere beauty of execution being of small value.

The young graduate at West Point leaves the Academy tired and worn out with books and study. Year after year, generals and professors inform him that his work has just commenced, and that to succeed in his future military career, he must continue his study. But how few there are who heed the warning or profit by the advice. Some never will study unless compelled to do so; others conclude to take a breathing spell, with good intentions to commence work again when they get rested. But in the majority of cases they never get rested; and, unless stirred up to a renewal of their exertions, continue to move along in the deep-worn rut of routine garrison duty, unmindful of that old adage that, "It is far better to wear out than to rust out." To a great extent, our young officers from the ranks and from civil life are in a similar condition; and for this reason alone these war colleges are of inestimable value in compelling every young officer of the Army to awaken from his slumbers and continue the study of his profession; and if the system of instruction be made interesting as well as instructive, the young officer will then return to his regiment with a more willing spirit to seek advanced knowledge of his own accord. The grandest and most valuable object of these institutions will be accomplished if they succeed in simply teaching every graduate to like the study of his profession, and in impressing on him more forcibly than ever that he has but laid the foundation upon which he must build the castle of military fame.

TRAINING AT MILITARY POSTS.

Can any fair-minded man deny for a moment that the present comparative state of idleness and inactivity at the majority of our military stations is greatly to be deprecated? During the summer months both officers and men are kept pretty much occupied with target practice and field exercises; but in winter nothing but ordinary garrison duty is performed. True it is that this routine work is irksome and monotonous, and a great deal of it could profitably be abolished. Much of the clerical work in connection with courts-martial, boards of survey, company, and post records should be abandoned.

Tattoo roll-call is a relic of antiquity, and is an unnecessary restriction. Guard duty should be lessened, as I have already

stated. But notwithstanding all this, a great deal of valuable time is wasted which should be spent in the gymnasium and in keeping abreast of the times in military acquirements.

Every commanding officer is responsible for the instruction and training of his command. To ensure the efficiency of a man in this age of rapid military progress, a constant study of the art of War will alone suffice to meet the requirements of a modern soldier. To accomplish this every post should be a school. At first glance it would appear absurd to send to school officers who are veterans, perhaps of two wars; but it must be remembered that the day of the muzzle-loader has passed, that we are now in the era of the breech-loader, and that with this change has come a complete transformation in the art and science of War.

General Sherman, in his "Grand Strategy of War," remarks in effect that he has often *heard* of great and inspired generals, but that he has *never seen* one. At all events, great generals even are helpless if their armies are lacking in fighting qualities, organization or battle tactics; and as our present infantry organization does not meet modern necessities, and our tactics are obsolete, we are in rather a pitiable predicament. Other things being equal, compare the qualities of the muzzle loader with those of the breech-loader, and you have, to a considerable extent, the condition of our war power as compared with that of almost any Continental army.

An officer who is unable to become efficient in his profession, and claims as an excuse that he is "too old to learn," should have his attention called to paragraph 36 Army Regulations; or, if his services warrant it, should be placed on the retired list. Two recitations a week during the winter months would not interfere with other duties, and would not only enable commanding officers to comply with the regulations in the above respect, but would materially increase the efficiency of the entire Army.

If such a course should receive the sanction of the War Department, and if examinations for promotion in the line of the Army were required, it would infuse new life and blood into the Service, crowd us out of some of the old ruts and customs, which are relics of a by-gone age, and make the Regular Army of the United States a truly modern body composed of educated and practical soldiers.*

* Since the foregoing was written I note the publication of General Orders No. 19,

Up to the present time no detailed method of instruction has been laid down by the War Department; but it seems clear that the first study to be taken up should be that of modern drill and battle tactics. It is hoped that our new system, now being prepared, will soon be ready for publication; but it is hardly supposed that it will appear in time to be put in practice during the coming summer.

Blunt's new "Regulations for Small Arms Practice" is however, available, and the study of this work could well be taken up at once; so that every officer might be perfectly familiar with it, in order to instruct intelligently his men on the practice field during the coming season in this all important branch of the soldier's training. "Fire is everything," says Napoleon, "the rest is of small account." If it was such an indispensable quality nearly a century ago, in the days of the flint lock, how invaluable must it now be with such deadly long-range, rapid-firing weapons as those with which troops are now armed.

Officers cannot devote too much time to this study of fire tactics and fire discipline. As I have before remarked, we are expert on the practice range, but there is nothing in our book of "Small Arms Practice," or in our tactics, which approximates to the training and practice necessary to fit men for actual service on the battle-field. In this connection another subject which demands immediate study in our Service is our ammunition supply, as at present we really have no system whatever. The old method of supplying troops on the battle-field with cartridges, by means of six mule teams, is a relic of the muzzle-loader, and totally inadequate and impracticable in the light of modern experience.* One of the greatest and most pressing needs of the

1889, from the Adjutant-General's Office, and from which I make the following extract:

"Both practical and theoretical instruction will be systematically conducted. Theoretical instruction, imparted by lectures, recitations or methods will be given at least *twice each week*, from October 1st to March 31st of each year, in the authorized tactics, and *such other military subjects* as may be provided by the War Department upon the recommendation of the General of the Army. Captains will be responsible for the practical and theoretical instruction of their non-commissioned officers, which will be regarded as strictly military duty, and will be so carried on as not to occupy any part of the hours devoted to rest or recreation. Regimental commanders will supervise the instruction of the officers under their immediate control and post commanders that of those officers who are serving at stations not the headquarters of their regiments." [The italics are my own.]

* If our new drill book does not throw additional light on these subjects, and we

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Every commanding officer is responsible for the instruction and training of his command. To ensure the efficiency of a man in this age of rapid military progress, a constant study of the art of War will alone suffice to meet the requirements of a modern soldier. To accomplish this every post should be a school. At first glance it would appear absurd to send to school officers who are veterans, perhaps of two wars; but it must be remembered that the day of the muzzle-loader has passed, that we are now in the era of the breech-loader, and that with this change has come a complete transformation in the art and science of War.

General Sherman, in his "Grand Strategy of War," remarks in effect that he has often *heard* of great and inspired generals, but that he has *never seen* one. At all events, great generals even are helpless if their armies are lacking in fighting qualities, organization or battle tactics; and as our present infantry organization does not meet modern necessities, and our tactics are obsolete, we are in rather a pitiable predicament. Other things being equal, compare the qualities of the muzzle loader with those of the breech-loader, and you have, to a considerable extent, the condition of our war power as compared with that of almost any Continental army.

An officer who is unable to become efficient in his profession, and claims as an excuse that he is "too old to learn," should have his attention called to paragraph 36 Army Regulations; or, if his services warrant it, should be placed on the retired list. Two recitations a week during the winter months would not interfere with other duties, and would not only enable commanding officers to comply with the regulations in the above respect, but would materially increase the efficiency of the entire Army.

If such a course should receive the sanction of the War Department, and if examinations for promotion in the line of the Army were required, it would infuse new life and blood into the Service, crowd us out of some of the old ruts and customs, which are relics of a by-gone age, and make the Regular Army of the United States a truly modern body composed of educated and practical soldiers.*

* Since the foregoing was written I note the publication of General Orders No. 19,

Up to the present time no detailed method of instruction has been laid down by the War Department ; but it seems clear that the first study to be taken up should be that of modern drill and battle tactics. It is hoped that our new system, now being prepared, will soon be ready for publication ; but it is hardly supposed that it will appear in time to be put in practice during the coming summer.

Blunt's new "Regulations for Small Arms Practice" is however, available, and the study of this work could well be taken up at once ; so that every officer might be perfectly familiar with it, in order to instruct intelligently his men on the practice field during the coming season in this all important branch of the soldier's training. "Fire is everything," says Napoleon, "the rest is of small account." If it was such an indispensable quality nearly a century ago, in the days of the flint lock, how invaluable must it now be with such deadly long-range, rapid-firing weapons as those with which troops are now armed.

Officers cannot devote too much time to this study of fire tactics and fire discipline. As I have before remarked, we are expert on the practice range, but there is nothing in our book of "Small Arms Practice," or in our tactics, which approximates to the training and practice necessary to fit men for actual service on the battle-field. In this connection another subject which demands immediate study in our Service is our ammunition supply, as at present we really have no system whatever. The old method of supplying troops on the battle-field with cartridges, by means of six mule teams, is a relic of the muzzle-loader, and totally inadequate and impracticable in the light of modern experience.* One of the greatest and most pressing needs of the

1889, from the Adjutant-General's Office, and from which I make the following extract :

"Both practical and theoretical instruction will be systematically conducted. Theoretical instruction, imparted by lectures, recitations or methods will be given at least *twice each week*, from October 1st to March 31st of each year, in the authorized tactics, and *such other military subjects* as may be provided by the War Department upon the recommendation of the General of the Army. Captains will be responsible for the practical and theoretical instruction of their non-commissioned officers, which will be regarded as strictly military duty, and will be so carried on as not to occupy any part of the hours devoted to rest or recreation. Regimental commanders will supervise the instruction of the officers under their immediate control and post commanders that of those officers who are serving at stations not the headquarters of their regiments." [The italics are my own.]

* If our new drill book does not throw additional light on these subjects, and we

average officer is instruction in modern battle tactics. We need not only theoretical information, but it is essential that practical instruction be imparted in the handling of squads, companies, battalions and larger bodies of troops in "battle array." To learn this properly we must start at the very bottom of the drill and work up, for *our present system of fighting is almost entirely obsolete, and the sooner we recognize this fact the better.*

Therefore, the first study should be that of modern minor tactics. Then we will be prepared for something more advanced. Next, the study of campaign strategy and grand tactics can be pursued with advantage. The profession of Arms is one that is constantly changing to meet improvements in armament, in the instruments of war, and in the means of communication; and it is only by profiting by the experience of others and by constant study and practice that our Army can expect to attain to a proper degree of efficiency. Lessons should not be of such length or frequency as to make it a burden to learn them; and the methods of imparting instruction should be such as to admit of discussion, so as not to remind an officer too pointedly of his schoolboy days, especially of those years of toil and confinement spent in his preliminary training at the Military Academy.

Due to the great diversity of opinion entertained by post commanders as to the theoretical and practical instruction of those under their control, the course of instruction to be followed should be mapped out by the War Department (as it is by this method alone that uniformity can be ensured), and inspectors should see that the duty is well performed. The successful pursuit of such a system would, in the near future, result in examination for promotion in all arms of the Service. In this event, a graduate of either of the three authorized schools for officers, who is physically and morally sound, should be entitled to his regular promotion to a captaincy without further examination. Other officers, before receiving promotion to that grade, should be required to pass a satisfactory examination, similar to the one required of a graduate at the end of the course of instruction at the school which pertains to his branch of the Service.

Suitable examinations for promotion to higher grades than captain should be prescribed by the War Department.

do not get an American work covering them, the student will find valuable reading on these topics in Captain Mayne's *Infantry Fire Tactics*, published in London in 1888.

MILITARY SPORTS.

I feel that I would be far from doing justice to my own ideas should I refrain from touching on a subject which seems to me to affect materially the future well-being of our Service.

In the pages which have gone before, I have spoken of the essential features which are requisite in the mental training of the Army, and of the physical requirements which are necessary to put this theory into practice. It is manifest that the body must keep step with the mind, or all our labor will be in vain. It is pertinent also to note that in the education of a soldier his mental training must bow to his physical development. An army composed only of brains and eyeglasses would be as helpless on the field of battle as an engineer trying to move a train of cars without a locomotive.

The various outdoor drills and marches constitute the principal sources from which our Army receives its physical training, and as these can take place only in fair weather, the men become soft by being comparatively inactive during the winter.

I have already remarked the necessity for the establishment of a gymnasium at every post in the Service, and suggested the advisability of requiring every man to take prescribed exercise every day. Under competent instructors, the men will soon consider it a pleasure to engage in athletic competitions, making this military duty take the form of an amusement as well as a promoter of physical strength. On suitable days, instructors should devise running and jumping matches, hurdle-races, foot-ball contests and similar sports.

I see no good reason why at least one evening each week should not be given to the men for the purpose of engaging in theatricals, or devoting it to such other amusement or recreation as they see fit. In this manner the men would have no time to get drunk, no occasion to complain, and health and vigor would be imparted to both mind and body, thus punctuating with dashes of pleasure the more confining and arduous duties of their military life. Saturday afternoons and so much of Sunday as remains after inspection should be given over to the soldier to occupy as he sees fit.

At present there is considerable discussion as to the propriety of abolishing Sunday inspections and parades; and although my opinion may carry but little weight, I give it for what it is worth,

as incidentally it bears on the subject now under my consideration.

In this regard I occupy rather an intermediate position, and believe in neither extreme which has been advocated, but consider that the best interests of the Service require a Sunday morning inspection; but I am decidedly opposed to any parade or other pomp and ceremony being connected with it.

The inspection should be "by company," and be essentially and purely a captain's inspection, simply for the purpose of enabling him, at least once a week, to know that his men are clean, that their equipments are complete and serviceable, and that their quarters are neat and in good order. This would not occupy an hour, and then the remainder of the day could profitably be given to the men for rest and quiet.

Once a month a regular inspection of the post by its commander would be sufficient to enable him to judge of the general cleanliness and efficiency of the troops under his control.

In conclusion, I would most respectfully call attention to the necessity of endeavoring to keep within bounds while pursuing any course of instruction; for it is a noticeable fact that armies have a decided tendency to overdo some duties to the almost total neglect of others quite as important, thus producing a detrimental effect on the system as a whole. As an illustration, we find our own Army at one period devoting its entire time to target practice, producing a body of paper sharpshooters, with little attention paid to drill, or mental or physical training. Again we find companies loading with eight motions, and learning to act like machines in executing the manual of arms, apparently losing sight of the more necessary and practical features of the soldier's education. The reaction sets in, and unless due care be taken the tide may turn to a mania for school instruction, to an unnecessary and undesirable extent, to the neglect of suitable marches and field exercises. Of course it is not reasonable to expect an army to be a machine, a physical giant and an encyclopedia all at the same time, but it can be made to possess all of these qualifications in a *moderate* degree. In fact, to such extent it *must* possess them, or it will be lacking in the essentials of a well-trained and well-disciplined military organization.

"The strength of a chain is measured by its weakest link." So with an army, which is indeed a complicated military machine; and when its strength is tested on the battle-field, if it fail to move

smoothly, or is found weak in any one essential, no matter how powerful or how perfect it may be in others, its efficiency will be measured by that one weak part. The importance then of sound military training in time of peace cannot be overestimated. On its success in war depends. In the words of a distinguished military writer: * "We train men in peace for what we wish them to do in war. When war comes we must be satisfied if they do what we have taught them. If the instruction is faulty, the country whose armies have been badly trained suffers. When war is declared the time for preparation, the time for training has passed: the day of action has come. If the weapon is not well tempered, wants edge, and is useless, the responsibility rests with those who have allowed it to become so."

FORT LEAVENWORTH, KANSAS, May 15th, 1889.

*Colonel Home.

SOME CONSIDERATIONS ON THE REVISION OF OUR INFANTRY TACTICS.

BY FIRST LIEUT. H. J. REILLY,
FIFTH ARTILLERY.

MILITARY HISTORY shows that improvements in Arms have always been followed by changes in tactics, especially in those provided for manœuvring troops on the field of battle, and that these changes have generally resulted in a reduction in the number of ranks with consequent simplicity of formation and celerity of movement.

In our war breechloading arms were used to a limited extent, and our infantry tactics adopted after its close, in 1867, provided the single rank formation as being specially adapted to their use, they were also used in the Schleswig Holstein and Austro-Prussian wars by the Prussians. In the Franco-German and Russo-Turkish wars the infantry on both sides were armed with them.

The experience gained in these wars, particularly the two last mentioned, showed that the use of rapid loading arms not only seriously affected the old conditions, but gave rise to new ones on the field of battle, which necessitated changes in the methods of handling troops while subject to their fire.

Since the Franco-German war, all the leading nations of Europe have modified or changed their tactics once or oftener.* The Germans have modified theirs five times, Italy and Russia each three times, and France and Austria each twice.

Our infantry tactics were revised principally for assimilation, in 1873, and the movements by platoon, the deployment of skirmishers from column, and also the deployment by numbers, were added to them, in further anticipation of the use of improved breech-loading arms in the future.

But since this revision for assimilation, additional improvements in arms have been made, and their rapidity of fire, and accuracy, have been materially increased.

At this time, the range of the modern rifle far exceeds the

*Brialmont.

vision of the infantry soldier on the ordinary battle-field, obstructed as it is, by the configuration of the ground, woods, or other obstacles. The time required for loading has been reduced to the minimum, and with the use of detachable magazines, rapidity of fire has probably reached its maximum; in consequence the volume of fire capable of being delivered at critical moments is enormous, and if properly aimed at advancing troops, would be irresistible.

Further improvement is now looked for, not so much in extension of range, as, by flattening the trajectory to increase the dangerous space. Every gain in this respect increases the useful effect of the fire at the shorter ranges, where its greatest efficacy is needed in both attack and defense, and where it is almost impossible to get the men to change their sights in the heat of action; in this way greater accuracy and rapidity of fire will also be attainable.

To accomplish these ends, guns of reduced calibre which use a larger charge of powder in proportion to the weight of bullet, than those now in use, are being experimented with: these guns have the additional advantage that the soldiers can carry a larger number of cartridges for the same weight than they now bear; a matter of importance considering the difficulty of supplying them with additional ammunition during battle. Although guns with permanent or detachable magazines have so far been adopted by but two or three nations, their general introduction is only delayed until greater simplicity is secured in their construction, or for financial reasons; therefore, they should be considered in any proposed modification of tactics.

All such modifications should be based, if possible, on experience gained in war; and it is only by careful study and consideration of the conditions which prevailed in the wars where both armies used breech-loading arms, that we can best determine what changes are now necessary in our tactics.

The effect of breech-loading arms in tactical formations is, fortunately, very clearly shown, among other things, in the history of the Franco-German War published by the Historical Division of the German Staff and in Lieutenant Greene's excellent History of the Russo-Turkish War.

But we should not limit ourselves to these works, because since they were published, very many experiments have been made at the polygons of the different nations that have given

valuable results which ought to be considered in connection with changes in tactical formations.

It is true that these results must be taken with very great allowance because of the impossibility of having the exact conditions, during the experiments, which prevail on the battle-field, where intense excitement, rapid movement and unaimed fire are the rule, rather than the exception.

In this connection it is only necessary to go back to the time when smooth-bore muskets were being displaced by rifles, and similar experiments made with the latter, were held by many to prove that the defense had gained so enormously that no front attack could succeed against troops armed with them, because of their great range and accuracy; and that artillery could not unlimber within effective range of its guns without suffering such losses in men and horses as to deprive it of further usefulness for the time being; while cavalry was held to be limited to action against disorganized or retreating troops and to outpost duty.

Even in the military literature of to-day it is not impossible to find similar predictions and these regardless of the occurrences of the last two wars, where intrenched lines manned with troops armed with breech-loaders were carried by successful front attacks, and bayonets and clubbed muskets were used; where it was demonstrated that no infantry attack should be made, or could reasonably be expected to succeed until the enemy was thoroughly shaken by the fire of artillery, and the artillery itself took position and held it against opposing infantry; and the cavalry showed its ability to penetrate the lines of the enemy in the battle-field and to sabre cannoneers at their guns.

It is true that excessive and unusual losses were incurred under these circumstances, but these resulted principally because the tactical handling of the troops was not in accordance with the conditions developed by the use of improved arms.

Early in the war with France the necessity for decreasing the density of their infantry formations was forced upon the attention of the German officers, and owing to the excellent discipline of their army, they were enabled to successfully make changes which thereafter reduced their losses materially.

Experience has shown that it is true, as General Upton said: "that whatever changes breech-loading arms may necessitate in the disposition and management of troops in battle, the employment of lines of battle, offensively and defensively, cannot be

dispensed with, neither can the means of massing and deploying troops be omitted," and I do not think it is likely that any very much simpler methods will be devised for forming line, from column and the reverse, or for massing and deploying troops, than those now set forth in his tactics.

The reasons for their excellence in this respect are undoubtedly because they were practically written and experimented with during our war, and they were completed immediately after its close, while the experience gained was still fresh in the memory of their distinguished author.

In addition much of the fighting in the Civil War occurred in densely wooded districts, where the opposing lines came so close, at times within twenty to thirty yards of each other, that the fire was as murderous and demoralizing as in any of the engagements in later wars where both parties used breech-loading arms.

At the same time I think it must be admitted that, under present conditions, these tactics do not sufficiently provide for that control and direction of the tactical units, and their fire during the combat, which has become much more difficult than heretofore; neither do they provide the best formations for keeping the losses at a minimum, and preventing the mixture of the men composing the units or the units themselves in the long advance under fire which is now necessary to prepare and deliver an attack.

The difficulties to be overcome are illustrated in the accounts of the battles of the Franco-German and Russo-Turkish wars, where the marked features, due to the use of rapid-firing arms, were the disadvantages the superior officers labored under in retaining control and direction of their troops while advancing to the attack; and their entire loss of control, sometimes even by the company officers, after the men were once engaged. This was due to the large size of the tactical units employed, their compelled deployment, by the severity of the opponent's fire, at distances varying from two thousand to three thousand yards from the enemy, and the dispersion of their component parts during the subsequent advance over these long distances. In the attack on the Rotherburg, for instance, there were "thirty-two companies of two different armies mixed up in utter confusion without unity of command." The trouble is also increased by the nature of the country over which the advance takes place, as at Baumont, where "the dense copse hampered the movement and

connection of the troops to such an extent that gradually all control ceased, and only isolated detachments, as chance carried them, found themselves in the more passable places." The difficulty of command is increased by the mixture of the different organizations, as we read that at Sedan, "other infantry detachments of the 11th Army Corps and of the 46th Regiment and 5th Rifle Battalion had become mixed up with the 43d Brigade, and in the course of the engagement the regiments of the latter were likewise so intermingled that the officer in command of the brigade had at his disposal a mere multitude of men about one battalion strong, composed of the most varied troops."

Similar results, due to the same causes, are noted in the attack on Flavigny, where "unity of command is speedily lost and the bravery of individuals takes its place. Guided by the formation of the ground, the enemy's sweeping fire, and the momentary inspiration of the officers, the company columns at full intervals are moved hither and thither."

The confusion resulting from the dispersion of the commands caused by the severity of the fire is shown in the account of the attack on St. Hubert's Farm, where "on the left of the 8th Corps, in the impenetrable wood, companies of different brigades were congregated 'pell-mell,' " and in the attack on Gifert forest, where "even the companies are much mixed up."

The great loss of men which the fighting line suffers from the want of sufficient officers with the large companies, and at critical moments, is aptly shown by Lieutenant Greene, who states: "The crowd of men going back to the field hospital was so great that the men having no officers thought it was a general retreat. Taking a few non-commissioned officers, Colonel Lapinsky, who commanded this part of the field, went back to the road, expostulated, reasoned, threatened and drove these men back to the position on Central Hill; from here they delivered their fire in volleys on the Turks, who were climbing the hill," and saved this critical position.

In the advance on Morsbronn, Battle of Woerth, we read that "the nature of the preceding struggles had necessitated the deployment in skirmishing order of the various battalions and companies of the 41st Brigade along the whole line from Gunstett to Spachbach; the large units had ceased to exist as such before the attack, and detachments of different regiments were indiscriminately mixed together." In these wars battalions, regiments and brigades fought while extended in dense lines of skirmishers, and

"whole regiments in the second line could not be prevented from drifting into and forming part of the first line;" this line would move forward until some portions of it would get within four hundred paces, others within three hundred and one hundred and fifty paces of the enemy, but seldom without suffering great and inevitable loss, this "advance would occasion separate strokes and counter strokes which naturally caused the tide of battle to roll back and forth," and as the incessant noise of the breech-loaders completely drowned the human voice, the work of commanding would become more and more difficult.

The tendency of troops to form in knots and groups is frequently shown, as at Gravelotte, where "the detachments of the 15th Division, thinned by the long contest, yielded to the forward strokes of the enemy, or grouped themselves pell-mell into combatant knots."

General Dragomiroff tells us of a similar tendency of the Russian troops when under fire after the passage of the Danube, when on landing, "they, the troops, formed themselves into improvised groups, each group observed attentively what its neighbor was doing, each regulating its movements by those of the others and lending each other a mutual support." Russia has the large company and battalion organization similar to the German.

Owing to a great extent to the incessant noise of the breech-loaders, the difficulty in controlling the fire of the troops so as to properly direct it and prevent the waste of their ammunition, was found to be almost insuperable. When the supply of ammunition the men carried with them was exhausted, it was often impossible, if desirable, to withdraw them to renew it. It was also found that troops who had used all their cartridges would sometimes abandon their positions when they were not subjected to direct attack. Shelter to protect the men from the severe fire was a necessity, and where it did not already exist, it had to be thrown up by the troops with anything available for the purpose; if any one lesson was learned in these wars, and we learned it in our own, and apparently have as readily forgotten it, it was that men must be provided with suitable intrenching tools and that they must carry a large proportion of them in order that they may be available when most needed.

When muzzle-loading arms were used there were always intervals with the company when the firing almost ceased; as when the majority of the men were loading; during these intervals the cap-

tain had no difficulty in making himself heard ; his company covered a very small front, the men being shoulder to shoulder, and he could manœuvre it with little difficulty ; at critical moments, or where necessary he could withhold the fire entirely, or until it would be most effective ; reinforcements took their places a units on the right or left of his command, and if necessary, he could close his men to the right or left to make room for them ; his control comparatively was complete.

Now, however, with breech-loading arms, it is the reverse ; the fire once started is unceasing, the captain can rarely make his commands heard ; he finds it difficult, if not impossible, to control the firing ; his company is spread over a much more extensive front, he has to advance it over very much longer distances under a more severe fire, alternately deploying to decrease its losses when without cover, or rallying behind shelter to fire or resist the enemy's attacks ; his men scattered in hollows or ditches for protection are loth to renew the advance, and finally when reinforcements come to his assistance, and he cannot close his men in to the right or left to make room for them, he finds himself surrounded by strange faces, his company disintegrated, and himself powerless. If this is the condition of the basis on which the whole system of command depends, how can the field officers be expected to influence the result except by an example of personal bravery ?

Granting that disorder and confusion are inherent in all battles, and that "the culmination of any battle is confusion," whatever the arms used, it is a fact that this confusion was not restricted to the culmination of the battles in these wars, but, owing greatly to the rapid firing arms, was noticeable from the commencement ; indeed the recognized problem to-day is, what provision can be made to secure that order and control in future battles which is a necessity in order to obtain adequate results for the men and material employed ?

It has been written "that disorder foreseen and regulated becomes order," but how is this confusion to be regulated ? The answer given by the Germans and French, as the result of their experience, is that you must have tactical formations suitable to the conditions existing in the battle-field ; and that the individuals composing the tactical units must be thoroughly instructed in the requirements of these conditions so that they will find in them only such surroundings as they have been accustomed to

in their ordinary peace exercises. Take the German methods, for instance, at the commencement of her war with France, her unit of combat was the battalion of 1,000 men, formed either in line three ranks deep or in attacking column, double column on the centre with skirmishers on the flank; but this formation was found to be too dense, and even with the company column which almost immediately displaced it, not only were the losses excessive, but, as we have seen, under the influence of the French fire, the commands dissolved into dense bodies or lines of skirmishers, which soon got beyond control and could not be properly manœuvred under fire. The necessity for determining better methods for handling troops under these conditions was speedily recognized, and the formation adopted by the left wing in the attack on Le Bourget was so promising that an order was issued in which the attack in open order, joined to the attack of skirmishers, was adopted as the only efficacious one, and it was strictly forbidden that closed bodies of troops should be led within a nearer distance of the enemy than 2,000 paces, about 1,700 yards; but even this formation left much to be desired, and in 1873, after the experience gained in the war had been thoroughly digested, further modifications were made and "the dispersed" order was authorized. This expression refers not only to the extended line of skirmishers which forms the front or firing line, but also to "the breaking up into smaller bodies of all troops when in contact with the enemy." As Colonel Newdegate says: It is the subdivision of a battalion into four company columns acting *subject to the orders of the battalion commander*, as independent units; and the partition again of these into zuge, half zuge and sections, the sections form "fire units" or "groups" containing not more than six nor less than four files, these groups are led by non-commissioned officers, and intervals are left between them on the fighting line, so that each group is distinctly defined.

The chiefs of groups dress upon each other, they repeat the orders of the zuge or platoon commanders, and assist in controlling and regulating the fire in accordance with these orders.

Russia, France and other Continental nations now have the division of their companies into five units or groups, and it is a recognized method for control of the fire in action; the group is the basis for skirmishing, and its instruction and leadership have assumed much more importance than heretofore. In these countries the greatest attention is given to the thorough instruc-

tion of the individual, and "Fire Discipline" is considered to be the most important part of the course. In this drill all the conditions which experience has shown may be expected in the battle-field, are simulated as exactly as possible, in order that the men may become so accustomed to them that when disorder and confusion do arise in battle there will be no loss of control in consequence; the greatest mobility is sought for in all formations, especially from column to line, which is executed with the greatest rapidity, and while all possible freedom is given the individual, and the cadenced step is not required in their execution, yet the most rigid discipline is maintained, and all exercises end in closed formations and the cadenced or parade step.

During our war a brigade was composed of from three to eight regiments; it was usually formed for combat in two lines; the first line covered with skirmishers, generally consisted of two or more regiments in line of battle, the second line was frequently similarly formed, and sometimes it was in close column of regiments or battalions and at times in double column. In the present tactics the brigade consists of a greater or less number of battalions than four, formed in two lines, the distance between them to depend upon the ground and whether the brigade is acting offensively or defensively, so that until 1873, there was practically no change, except the provision of the single rank formation. In that year, however, the deployment of the battalion by the numbers was introduced as being a method specially adapted to brigade manœuvres and to meet the requirements of breech-loading arms. The regiment or part of it, of two or more companies constitutes a battalion. The regiment in numbers is the equivalent of the German battalion, about 1,000 men, which we have already seen was too large a unit for use on the battle-field where breech-loading arms are used, the same objection applies to our regiment.

If it is deployed by the numbers we have successive thin lines, which in the long advance under fire, lose their cohesion, either, because of the difficulties presented by the ground, or because the men composing them naturally avoid the more exposed places, and collect together behind cover; in availing themselves of this they become crowded, and a large proportion of their fire is masked, the officers, owing to the mixture of strange men with their commands, lose control, and advantage is taken of this by the stragglers, when the line again moves forward, to remain behind and go to the rear. The second line would encounter similar

troubles, and owing to the strong desire of the men to fire would soon be merged with the first, so that its value as a support would be of no practical benefit. When the modifications in the German tactics were being considered, it was proposed that the supports should be extended as skirmishers, but when the changes were determined upon the opening out of the supports was not authorized.

Similar objections apply in a much greater degree to the battalion deployed as skirmishers. As prescribed in this case, giving it an effective strength of only eighty per cent., the line would cover a front of twenty-five hundred yards, about. It would be exceedingly difficult if not impossible to control such a line when it was subjected to the fire of modern arms in the long advance.

The battalion formed in three lines, as prescribed, four or five companies in one, two or three in the second, and the remainder in the third, would be less difficult to control; but has the grave objection that there would be a mixture of the men of different companies the first time the fighting line was reinforced.

To overcome these difficulties, and not suffer undue loss, we must have closed formations which will give us such small units, that they can move with the greatest rapidity, give the maximum fire and yet be under complete control; in other words, we must resort to a greater subdivision of our tactical units to get the advantages of the dispersed order, and while their commanders are given more independence, we must be careful above all things to leave the direction of the combat where it rightfully belongs, in the hands of the superior officers.

To accomplish this and counteract that great tendency to the extension of front at the expense of depth, the regiment, already an administrative unit, should be composed of three battalions, and each battalion should have its own commander, who should remain with it as much as possible and be responsible to the colonel for its instruction and efficiency; this to replace the indefinite command of a wing when on the line of battle with its many and serious disadvantages.

By giving his field officers four companies each and retaining the other four under his own control for use against flank attacks or for extending the front line, or by retaining a section or platoon from each company for reinforcements, when necessity compels the covering of a larger front, the colonel is enabled to retain direction of the combat, and carry out the instructions of his brigade commander, while his field officers have greater in-

dependence in their own sphere, and each has an extent of front over which he can readily exercise control.

No handier unit than the four-company battalion can be obtained for use on any battle-field ; it gives a compact body of effectives numbering from 380 to 400 men ; more than the German and French company column ; but more manageable and inherently possessed of greater power of discipline because of its permanent division into four companies each with its commander.

But, as we have seen, even the German company column of attacks, double column of half companies, was too large for effective control, so that to utilize the advantages of the battalion, the field officer in command of it must have the direct and positive assistance of the company commanders, and to render this assistance of value they in turn must have more independence than heretofore in carrying out his instructions.

But again, as already shown, the captain stands in exactly the same relative position to his company, owing to its greatly increased power, the greater extent of front it will cover, and the difficulty of control under fire, as the colonel did to his ten companies. Consequently, to give him perfect control over his company, he must have the assistance of his subordinates, and they to be responsible, must have the direct command, hence the platoon, with its commander, becomes a sub-unit of importance for control and movement in the advance to the attack, or on the fighting line.

The platoon is the smallest subdivision with a commander which is recognized in our infantry tactics. It was introduced in his work, in 1873, by General Upton, who probably recognized the tendency to the greater partition of the tactical units, which we have noted.

But even the platoon, which would consist of from forty to forty-five effectives commanded by a lieutenant, is a larger unit than can be controlled without assistance on the modern field of battle, where it will be so essentially necessary that there should be no waste of ammunition, that all movements should be executed with the greatest rapidity, that shelter should be utilized, and above all things straggling prevented ; therefore, to be consistent, the platoon should be composed of two or more subdivisions.

Now, our present system of tactics is based upon a unit, the front of four men, and the question naturally presents itself, why

not utilize this unit by giving it a commander, a non-commissioned officer, and thus not only obtain the equivalent of the foreign "fire unit," or "group," but what is far more important the active assistance, on the march and in battle, of our non-commissioned officers by giving them direct control and responsibility. This is what should be done, and in this way is readily obtained the basis of the tactics of the future, of which Lieut.-Col. Maurice struck the key-note when he wrote: "The more small knots there are under the authority of non-commissioned officers, and the whole system is built up from that point onwards by a regularly extensive progression of command, the more complete will the effective power of manœuvring become."

The division of the company into platoons is now effected by placing corporals on their left and right respectively, or, if there are no corporals available, by simply indicating the dividing line, and notifying the men between whom it falls that they are the left and right files of their respective platoons; now why not carry this further, and by placing a non-commissioned officer on the right of the front rank of each set of fours, determine the unit permanently? By doing so, we would get a squad consisting of not more than eight men and a non-commissioned officer; by uniting two squads and putting a sergeant in charge of them on their right in the front rank, we get the next subdivision, the section—and thus we obtain that regular progressive extension of command in the squad, section, platoon, company, battalion and regiment, each with its own commander.

Our present tactics are peculiarly susceptible to this change, which is in itself only a modification and adaptation of the dismounted drill adopted in the artillery tactics of 1859.

The substitution of the squad with its leader for the "front of four men" determined by enumeration will greatly simplify our tactics, inasmuch as it does away entirely with the numbering which now determines their basis, and gives in place of abstract numbers non-commissioned officers, who, not only determine the unit but, control and lead it both in war and peace.

Numbering the men takes valuable time, it only determines the unit for the time being, and it has to be repeated whenever that unit is broken up or becomes disorganized from any cause, even on the battle-field, if it is used, it is of no assistance in rallying or reforming a broken command; no formation now in the tactics is dependent on its continued use.

When there is not a sufficient number of non-commissioned officers, intelligent privates can be selected to replace them.

The size of the company as a tactical and administrative unit was originally determined by the number of men who could be disciplined and fought by one man, and, although improvements in arms have increased its power and extended the radius over which this power can be exercised, as well as increased the difficulties of applying it, there is no necessity for decreasing the number of men in it—because retaining the same number as heretofore, by subdividing it, and giving commanders to the subdivisions, the captains with their assistants will have no more difficulty in commanding it than heretofore, because, instead of communicating directly with each individual of his 100 men, he will deal directly with the non-commissioned officers; for this reason but little change in the present organization would be required.

On a war basis, the company should consist of twelve squads, each composed of not more than eight men and a non-commissioned officer, six sections, each consisting of two squads and commanded by a sergeant, two or more sections to a platoon, commanded by a lieutenant, and two platoons to form a company, which will be composed of 96 privates, 10 corporals, 7 sergeants and 2 musicians, a total of 116 enlisted men, commanded by a captain, who is assisted by two lieutenants.

The first objection which naturally presents itself to this formation of the company, is that it will be without file closers other than the officers; but this in itself is no disadvantage, because the non-commissioned officers are placed where their services are of the greatest benefit, and the company is at liberty to be manœuvred as readily by the rear as by the front rank, besides experience shows that in war non-commissioned officers are but of little use when acting as file closers. As such "they have general charge of the men in their front to rectify mistakes and insure steadiness and promptness in the ranks, prevent men from falling out, etc.," but these directions, excellent in themselves, fix such an indefinite responsibility that it is hardly practicable to enforce it. The non-commissioned officer having no direct command feels no responsibility, he fails to prevent men from falling out either on the march or in battle, and in the latter case especially the evil increases to enormous proportions; both in General Humphreys' campaign of 1864, and the account of the Franco-German war, almost identical descriptions of this evil are given; we read that "the sudden

outburst of musketry and backward streaming of stragglers point to a fresh crisis in the engagement," and the necessity for reinforcements.

In fact, at such times, the men in line being unaccustomed to having the non-commissioned officers in their rear exercise any control over them pay but little attention to their directions, and not infrequently they are inclined to resent what they regard as uncalled for interference.

Now, on the other hand, just as soon as you place the sergeant or corporal in the front rank and give him direct control of the sixteen or eight men on his left you give him a distinct charge which excites his feeling of responsibility; he has no hesitation in controlling his men and they soon acquire a feeling of subordination and obedience to his commands; you give the captain and his lieutenants the direct and positive assistance of the best men in the company in assuring the execution of their commands, and establish on a firm basis the preservation of their control in times of the greatest excitement and danger.

In action the squad leaders should repeat all commands for their squads; they should keep their men together; direct their fire; prevent them from wasting their ammunition, see that they do not linger unnecessarily behind cover, and keep them from falling to the rear; they should direct the men who are to throw up cover while the others protect them with their fire; and in case of disorder after a successful advance, or sudden compelled retirement they are the tangible marks on which the men should rally. In such a case as this, they should place themselves in line, at squad intervals, facing the enemy, so that the command may be established on the instant ready for offensive resistance.

As instanced in the passage of the Danube, in times of danger men naturally gather together in knots and groups, as they will also in advancing under fire, and the feeling which prompts them to do so, should be utilized for purposes of discipline.

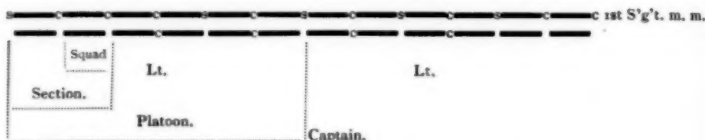
The formation of squads is already recognized in our Regulations for purposes of discipline and police in barracks, and it provides a unit which is peculiarly adapted to our system, or rather want of system in raising armies, which is always done hastily and at the last moment, when little or no time can be given to drill or instruction. In such a case the captain can have his company of one hundred men ready for service in the minimum time, because he can give theoretical and practical instruction to his non-com-

missioned officers, and they can impart it to their respective squads; this method will give the best results in the shortest time, because each non-commissioned officer will be anxious to have his squad become proficient as soon as possible.

When the squads are united the correct execution of all company formations is provided for, because the non-commissioned officers are the pivots and guides in all the movements. The substitution of "squads" for the sets-of-fours would require but comparatively few changes in the school of the company and battalion in our present tactics.

The first would be the entire disuse of numbers with the consequent change in the formation of the company, which would be very similar to that of the battery dismounted, the non-commissioned officers taking their places on the line and the men of

COMPANY IN LINE.



96 Privates,
12 Corporals, c.
6 Sergeants, s.
2 Musicians, m.

12 Squads.
6 Sections.
2 Platoons.

116 Total enlisted.
3 Total command.

119 Aggregate.

each squad falling in on the left of their respective squad leaders; the advantages of having them always fall in facing to the front—towards the enemy—are so apparent that it is not necessary to repeat them. In this connection we must remember that we are not dealing with the small companies of to-day, but providing for companies of from 80 to 100 men, which would always be formed in double rank, and ordinarily manœuvred in the same formation; in fact, always, except at drill or in action. Each chief of section should call the roll of his section, and report the result to the first sergeant, who reports to the officer; this would save seven-eighths of the time now required to ascertain if the men are present.

As there would be no front or rear, or right or left to the company, except as it stood for the time being, its mobility would

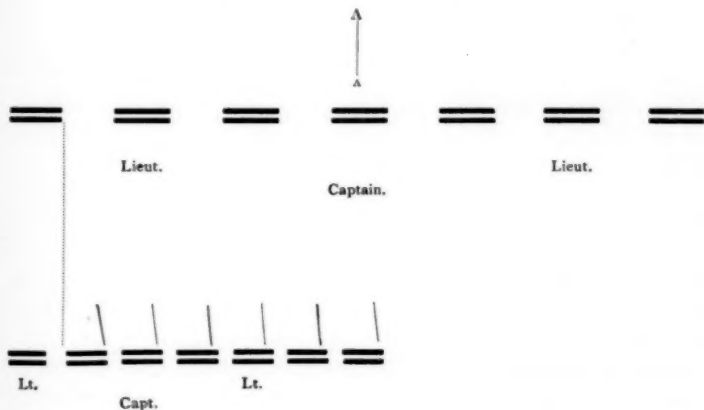
be much greater than now. The squad leaders would always retain their position on the flank of the squad which they took when the company was formed; if the company is faced about, all vacancies in the front rank would be filled by the men opposite to them in the rear rank. The word "squad" would have to be substituted for the word "fours;" for instance, to march the company by the flank, the command would be "Squads right;" to reduce the front while marching by the flank the command would be "Right by double files," instead of "Right by twos."

Whenever it becomes necessary for the officers to take their places in front or rear of the company, when in line, they should pass through the interval of the nearest chief of section, who should make room by taking a step to the front or rear and one to the right.

The advantages of the substitution of "squads" for "fours" are much greater in the company and battalion skirmishing than in the closed formations. In all the deployments, which can be

COMPANY IN "LINE OF SQUADS AT DEPLOYING INTERVALS."

While in this formation the company may be manœuvred by the commands prescribed in the School of the Company.



as easily made from line or column, the intermediate formation of a line of squads in closed order but with deploying intervals, offers all the advantages which can be obtained from the dispersed order and leaves complete control entirely in the hands of the battalion commander. This intermediate formation provides

the most suitable method for either deploying a skirmish line, supporting it during a stationary fight and reinforcing it for an assault, or to resist one made by the enemy. To obtain this intermediate formation the skirmish drill should be modified, so that at the command, "Skirmishers, Halt," the squads, after getting their intervals, should stand fast. This line of squads, with deploying intervals, can be manœuvred or caused to execute the firings by the commands and means prescribed in the respective schools of the company or battalion. Each squad leader is responsible for the interval, alignment and general direction of his squad, the chief of the centre squad being centre skirmisher. When the instructor wishes the squads deployed he commands, 1. Deploy, 2. March, which is executed by the men of each squad taking their intervals to the left of their squad leader, front and rear rank men alternating. All rallies should be to the right on the squad leader, and although deploying all the men to the left, instead of to the right and left, as now prescribed, would take from ten to twelve seconds longer, the greater simplicity of the movement more than compensates for this disadvantage.

Applying this to the deployment by the flanks, the movement would be by squads instead of individual skirmishers; the leaders being the only ones responsible for the intervals, the execution of the movement would be facilitated and take less time than now.

The habitual interval, five paces, is too much, it would be better at three, although of course the actual interval is really determined by the object in view, the ground to be covered and the number of men available; at five paces the ordinary casualties would leave the line so attenuated that it would lose its cohesion. The four company battalion deployed at five paces would cover a front of about 1,120 yards; at three paces, it would be only 672 yards, which is certainly as much as can be kept in view on ordinary ground.

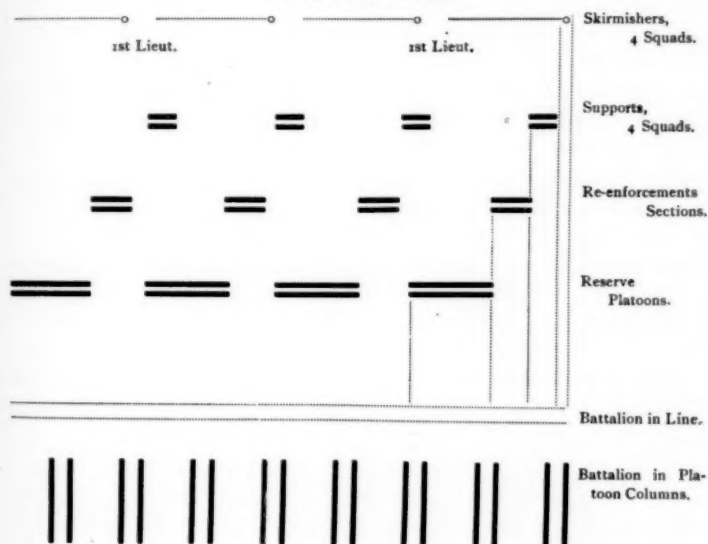
The central changes of front, even considering their utility in connection with the central change of front of a brigade, are of doubtful value, in view of the difficulty of their execution and the rarity of their use.

The control of the fire is so important and the use of squads is of such advantage in obtaining it, that the paragraph which prescribes the firings should be modified. The command should be: Fire (three or four or so many) cartridges at — yards, Com-

mence firing, the firing being executed by the rear rank men whenever it is prescribed for odd numbers, and front rank men for the even numbers. By limiting the number of cartridges, the fire is more easily controlled, the waste of ammunition sensibly avoided, and the smoke given a chance to rise; it also gives an opportunity for the chiefs of squad to see that the sights are altered when the firing is beyond battle range; the advantage of having one man to every six or eight to enforce the orders for firing or to cease firing cannot be overestimated.

As no numbers are used, there is no restriction as to the place of any individual in the squad.

DEPLOYMENT OF THE BATTALION TO THE FRONT BY NUMBERS, EXECUTED BY SUB-DIVISIONS.



The rallies by fours, company or division, when the command is threatened by cavalry, may as well be omitted in any revision of our tactics, because the time lost in rallying is most valuable for that cool, steady firing, which can alone avert the danger; this was conclusively proven in the Franco-German war.

In skirmishing, to avoid the mixture of the men of different companies, the reserve should consist of a certain number of squads, sections or a platoon from each company. For example,

if we take the deployment of the battalion by the numbers, as it would be modified by the substitution of squads for fours, we find it can be executed when the battalion is in line or in company or platoon columns equally as well.

This movement would be executed at the commands, 1. One (or more) squads as skirmishers, 2. March. At the second command, the right squad of each company moves to the front; the chiefs preserve the general alignment and intervals, the centre skirmishers the direction. The first lieutenant of each odd company accompanies the line and commands the squad from his own company and the one on his left.

A second line of squads (or subdivisions) is similarly deployed and is accompanied by the first lieutenant of each even company. When this line joins the first line, the latter will then consist of a section from each company of the battalion, each commanded by a first lieutenant of the company to which it belongs. A third or more lines of squads may be similarly deployed, accompanied by the second lieutenants of the odd and even companies respectively, to act as supports or reinforcements.

The battalion commander may send forward a portion or all the squads from all or any number of companies to strengthen the whole or any portion of the line as he may desire. In the latter case, the command would naturally be: So many squads from (such) company as skirmishers, March; each squad being conducted by its leader. Similar deployments may be made from the heads of columns when the battalion is deployed in platoon or company columns. A battalion deployed in this way, giving it an effective of 80 per cent., and giving each man a front of 24 inches, which is about the space necessary to give a soldier the free use of his rifle, would cover a front of about 128 yards.

If one squad from each company is sent forward the first line will consist of four squads, thirty-two men and four leaders, one man to each three and a half yards about, controlled by two lieutenants. Each officer has thus a front of sixty-four yards to look out for, which is not too much as the execution of his commands is enforced by the chiefs of squad. If a section from each company is sent forward there will be one man to one and a half yards and an officer to each thirty-two yards.

In action it is not probable that the men will distribute themselves evenly in the space between the two leaders, they will more likely be found more or less closed in on the squad

leaders, which will be an advantage as the open spaces on the left of each squad will be available for reinforcements; at first sight these open spaces might seem to weaken the line, but it is rather the reverse as with long range rapid loading arms they would be covered by a cross fire which would take an advancing enemy both in front and flank.

A second line composed of such small bodies as squads or sections can readily find cover and be kept within supporting distance of the first line without suffering excessive loss; the chiefs of squad on this line should always endeavor to keep in rear of that portion of their own company which is on the first line, to avoid the mixture of the different units.

If the first line is driven back, it can readily pass through the intervals in the second line, and the pursuing enemy is met with the fire of a line of subdivisions in close order, under perfect control.

When the first line has advanced it should be followed by the remainder of the battalion in line of platoon or company columns, depending on the shelter afforded, and taking advantage of cover send forward such lines of squads or sections as may become necessary in the course of the action.

From the foregoing, it may be admitted that the principle of great subdivision may be consistently applied to the existing tactics, and that it provides the smallest practicable sub-units with leaders, by which only can complete control on the fighting line be retained. It is not pretended that this or any tactical formation can do more than provide the means for the end, nothing can take the place of the most thorough and complete instruction of the individuals, officers and men; the successful application of any tactical formation depends now more than ever upon the skill and ability of the subordinate commands.

By having three battalions to our regiment the major has a distinct command for which he can be held responsible, in place of the indefinite wing; all wing formations could be advantageously omitted. All that relates to the regiment and all movements by division should come under the school of the regiment; the battalion taking the place of the division; the term, "division," would no longer be required. The regimental formations, now divisional, are particularly adapted to taking position preparatory to the commencement of an engagement.

The proposed organization would give the regiment 1,392

men, which would rarely give more than 1,100 effectives in war; as soon as a regiment became depleted by service, one battalion should be sent home to recruit and the convalescents should be sent to it rather than to the large camps of distribution which became a necessity in our war, and from which it was difficult to get the men back to their regiments.

In brigade formations the disuse of the division is particularly advantageous, as in its place we would have the permanently distinct unit, the battalion with its commander; for instance, instead of the command, "On first division, first battalion, deploy column," we would have, "On first battalion, first regiment, deploy column."

A much greater change than is proposed here, even the entire disuse of the tactics now authorized and the substitution of others is often advocated, but it is extremely doubtful if any necessity exists for such a radical measure; that portion of the tactics which provides for handling troops under fire must constantly change with improvements in arms, but the tactics resulting from these modifications are always best when they are the result of a progressive growth, particularly when based upon war experience; the value to be given to experiments most carefully made in time of peace is very variable and it is an untrustworthy guide; for instance, of the experiments in firing some say only $\frac{1}{30}$ to $\frac{1}{40}$ of peace results can be relied on in war; Germany says $\frac{1}{10}$; Austria, $\frac{1}{10}$.

The question also arises: Have we too many formations in our tactics? That they are not all necessary for use on the battle-field may be admitted; at the same time a command which is well drilled in all of them will always be of greater value than one which is not. Drill and discipline are synonymous. But no command should be limited to a constant repetition of the different formations on the parade. Once learned they should be applied, the command should be manœuvred; that is, it should be exercised in the application of the evolutions combined with the ground and the position and movements of an enemy. In this way only can it be thoroughly instructed and prepared for battle.

Reprints and Translations.

FORTIFICATIONS AND FLEETS.

By MAJOR G. R. WALKER, R. E.

Reprinted from The Journal of the Royal United Service Institution.

ENGLAND is the only civilized country where, at the present time, it is possible to stand up and to deny, with any chance of acceptance, the utility of permanent fortification. The discredit which in this country alone attaches to this, one of the most useful subsidiaries of defense, is due to our insular position, and to the very widespread superstition which exists amongst Englishmen that the sea alone is a sufficient defense, and that they can, in consequence of their separation by the sea from the European Continent, look down in selfish complacency upon the struggles and sacrifices of the less favored nations who are cursed with land frontiers.

This unreasoning dependence upon the protection afforded by the accident of insularity may possibly be traced to our great national poet, whose sentiments color largely, though often unconsciously, much of the popular thought even of our own day.

The well-known lines—

"This fortress built by Nature for herself,
Against infection and the hand of war ;

* * * *

This precious stone set in the silver sea,
Which serves it in the office of a wall,
Or as a moat defensive to a house,
Against the envy of less happier lands."

echoed as they have been by many subsequent writers, are probably largely responsible for the fact that the average Englishman looks with suspicion, the unreasoning suspicion of ignorance and prejudice, upon those who feel it to be their duty to enlighten him as to the real nature of the dangers to which the country is exposed, and as to the folly of trusting exclusively to the maritime frontier for defense. But though this popular ignorance is no doubt widely spread, I hardly expected to find Admiral Colomb appealing to it in his letter to the *Times* (11th March, 1889), with the time-worn platitude "Britannia needs no bulwarks, no towers along the steep;" the alternative being of course the wooden walls.

In fact, says the gallant Admiral, Britannia rules the waves, and in his paper lately read in this Institution, he asserts that there is consequently no fear of any territorial attack, not only on the shores of these islands,

but even on any part of the Empire, and in his character as advocate he goes so far I think as to attempt to show that we may dismantle our fortresses as being useless, though he shrinks apparently from the further deduction drawn by General Erskine from his paper, that we should also disband our land forces.

In his general reply to the discussion on his paper Admiral Colomb, as I understood him, withdrew so far from the position which he had assumed in order to invite discussion, as to admit the usefulness of fortification within certain limits, and only to object to its employment on a large scale. He did not, however, define the amount of fortification which he would admit, except in a rather vague and unwilling concession of "light batteries" for the commercial ports. But his concessions in this theatre seem to me completely revoked by his letter to the *Times* of the 11th March, in which he says, "the discoveries of science and the fluctuation of opinion have been fatal to fortification;" and in an able leader in the *Times*, on the morning after Admiral Colomb's lecture (1st March),* we find all his arguments pushed to their logical conclusions, with the inevitable result plainly stated in these words, viz.: "Every penny spent on fortifications before our navy is made strong enough to take and keep command of the sea is a penny wrongly spent, to say the least, if not absolutely thrown away."

Again, Professor Laughton, in the *Morning Post* (9th March), enforcing Admiral Colomb's arguments, accuses those who took part in the discussion on Admiral Colomb's paper, especially the military officers, of having misunderstood him so far as to believe he wished to leave our ports undefended, whereas, he says, Admiral Colomb only contended that they should be rightly defended, *i.e., by ships*. But that there might be no mistake as to the meaning of his paper, Admiral Colomb, in his letter to the *Times*, already quoted, institutes a comparison between ships and forts, to show that the reverse of the commonly received opinion is true, that ships last from generation to generation, while forts have to be pulled down about every twenty years, to make room for their successors; this, broadly stated, is the gist of that letter.

Now putting aside all fine distinctions, the broad meaning of all this is, that until our navy is strong enough to take and keep command of the sea, not a penny is to be spent (there is the kernel of the whole matter) on any subsidiary such as fortification; and that means, if words have any meaning, cease even to maintain your existing works, and above all do nothing to increase their efficiency, as to do so will cost money which might otherwise be spent on the navy.

This is the broad issue, and in support of his contention Admiral Colomb brings forward many arguments, appealing chiefly to history. Now this appeal is perfectly just; the principles of strategy are universal and unchanging, but it must be accompanied by a fair consideration of the fact that even in the sphere of strategy the changed conditions lead to some alterations, not in the eternal principles, but in their application under given conditions.

*See *Journal*, No. 147, page 149, *et seq.*

On page 5 of his paper, Admiral Colomb says: "Steam and electricity have everywhere replaced uncertainty and chance by certainty, and have immensely shortened times and distances as measured by times;" but he has omitted a very important point, which has a large bearing on the question at issue, viz., that they have also greatly increased the frequency of the *necessary* communications with the base, both for the supply of coals and for refitting. This omission is, I think, a fair example of the half truths by which Admiral Colomb's arguments are sustained.

Admiral Colomb, in his paper, maintains the following propositions, viz.:

1. That at the commencement of a war the superior naval power takes command of the sea, and that she never loses this command at any time or in any place during the struggle. Wherever an enemy's squadrons appear they are at once confronted by a superior force of the superior naval power, and instantly driven back to the cover of the land forts, which are admittedly useful to the inferior naval power.

2. That no enterprise against an enemy's territory or fortresses is possible within 700 miles even of an inferior hostile fleet, and that such enterprises must always be abandoned if there is the least chance of the loss of command at sea.

3. That a fortified base confers practically no advantages upon a fleet, either in the way of freeing the fleet for offensive operations at sea, or of facilitating its refitting.

4. That the possession of maritime fortresses follows the command of the sea.

5. That fortifications have never resisted a determined attack from the sea.

And in his letter to the *Times*, quoted above, he adds a rider, viz.:

6. That ships are long lived as compared with land works, and therefore more economical.

I shall now endeavor to meet these contentions in detail.

1. The assumption as to the command of the sea involves the attainment by the superior navy, *at the outbreak of war*, of a condition of comparative superiority to all other naval powers which is perfectly Utopian. It is undeniable that if the British navy be so strong that it can watch every possible enemy with a superior force, protect every port and every trade route over the whole surface of the globe, chase and bring to justice every "Alabama" that may break loose from any neutral port to prey upon commerce, and do all this with a force which shall provide ample reserves against every casualty caused by the manifold dangers to which the complicated modern war steamer is exposed, then Admiral Colomb's argument is unanswerable from the military point of view; everything has been done, therefore nothing remains to do. But the question would even then remain, is this the most economical method of doing the work? Certain duties of local defense of depots, arsenals, etc., have (I assume for the present) to be performed, and to perform them efficiently in the absence of local defense, some portions of the superior fleet must be detached as permanent local guards for these ports. It is not necessary to argue that for

such purposes the defense could be more economically carried out by coast defenses; even Admiral Colomb's strong supporter, the *Times*, says (30th August, 1887): "Ten or twelve guns can be mounted, *even in War Office cupolas*, for less than the cost of a single ironclad," and "these guns would render the Mersey or the Clyde secure at a fraction of the cost of defense by a fleet." Truly "a Daniel come to judgment."

I know it will be objected, but we have, *ex hypothesis*, command of the sea, and we need not therefore detach ships because every squadron of the enemy will be opposed by a superior British squadron, and therefore if he appear before a port for the purpose of attack, the superior British squadron will be there for defense, and until the enemy's squadron appears, the port may be left to itself, for there is no one to attack it. Now if this be true, it is true of Portsmouth, or Plymouth or Malta, as well as of the ordinary commercial ports, and all such naval arsenals may be left undefended; indeed the gallant Admiral in his paper, in putting the imaginary case of the appearance of an enemy's squadron off Plymouth, expressly asserts that the fortifications are perfectly useless, and that even without them the place would be unassailable, because of the flanking fleet off Brest.

Now let us look at some facts: there is, I presume, no doubt that England had the undisputed command of the sea after Trafalgar, and up to the end of the war: "In 1810 we had 664 cruisers at sea as against 105 in 1887, and though 19 of the enemy's cruisers were captured in less than a month, still in one fortnight 20 British ships were captured by the enemy close to our coasts."* Where were our superior fleets; why was there not a superior force present on every occasion to save these British ships? Simply because it was an utter impossibility, even for the large number of ships we then had at sea, to be everywhere, even over the comparatively limited areas then to be watched and guarded, and how much more would that be the case to-day? Admit even the inadmissible, that the British squadrons are sufficient to watch all the enemies' fleets; that they are impervious to all attacks by any possible enemy; that for once in war the unforeseen shall never happen; that the weather shall be as complaisant as the enemy is weak; that there shall be no dangerous rocks, no hidden shoals, no earthquake, no hurricane, no worn-out boilers, no broken down machinery; admit, in fact, the impossible, and still what remains? Why that even by Admiral Colomb's own admission, the sea will be covered with the enemy's cruisers which cannot be restrained from taking the sea and doing mischief, and as a necessary consequence that every important base and every naval arsenal, if left undefended by fortification, will have to be watched and defended by ships told off for the purpose and chained to the port. Because I assert that Admiral Colomb's assumption that such cruisers would not attack undefended forts for fear of interruption, is altogether untenable.

He says, in the imaginary case of Plymouth quoted above, that the dread of interruption would prevent an enemy from sailing up the harbor and destroying the dock-yard, even though there were no fortifications; but this makes surely too great a demand on our credulity; naval history may

* Admiral Colomb, in *Manchester Courier*, 3d December, 1887.

answer "No," but what would be said by his superiors to a naval officer in command of a powerful modern cruiser, with all the means of destruction at his command, who should refuse to strike such a blow as the destruction of one of our great naval arsenals for fear of interruption? Steam gives certainty; quite so. It would give this officer just a certain number of hours to blow in dock gates, burn the dock-yard, and the certainty of being able to leave again, bar accidents, just in time. The matter is hardly susceptible of further argument; it is a practical question, which I rejoice to think has been put out the power of an enemy's cruiser to decide against Admiral Colomb, by the common sense of our rulers, who have fortified Plymouth.

But let us look outside the British Isles and the narrow seas; the British Empire is scattered over the habitable globe, and if reasons have been given for refusing to believe that even the most powerful fleet can ever keep the coasts of the home islands entirely free from the enemy, how much more will it be impossible to protect every depot and dock-yard throughout the world.

We have been considering the question hitherto on the assumption that we have the command of the sea, to the fullest possible extent to which it can be assured, by raising our fleet to the position of superiority demanded by naval officers, but let us descend into the region of practical politics, and ask what this fleet is, to which alone we are requested to entrust the safety of the naval arsenals and depots. Why by the confession of the Admiralty itself, a sum of about $12\frac{1}{2}$ millions must be spent, in addition to the usual estimates, within the next four years, not in order to create an ideal navy, but simply to bring the navy up to a condition to enable us to fulfill the *minimum* requirements in a war with any two naval powers. In other words, the navy is at the present moment short of a large number of ships to the value of $12\frac{1}{2}$ millions of money, and this is the result of the administration in years of profound peace, during which we have been told over and over again by official authority, that all things were well with the navy. Is this an encouraging time to ask us to put all our eggs into one basket, the navy?

Again, are these $12\frac{1}{2}$ millions sufficient? Supposing we get through the programme, and at the end of four years have 70 ships added to the navy, shall we then be able to take and keep command of the sea, in the sense meant by Admiral Colomb? I will quote some naval opinions.

Admiral Sir G. Hornby states our requirements in cruisers alone at 186, of which we had only 22 which he considered efficient; and the same gallant officer, in reply to Mr. Forwood, who had said that his demand for 186 cruisers was absurd, states that in 1794 we had 180 cruisers at sea, in 1803 during the Peace of Amiens, 146 in commission and 178 in reserve, in 1804, 257 at sea, in 1812, 444 at sea. He wanted, he said, only 57 new cruisers to make up the required number; he then adds some caustic remarks on the system of administration which, with 106 cruisers in commission, and 23 ready for sea, had actually only 37 effectives out of the whole lot.

In another letter to the public press the same gallant officer gives the

number of ironclads required to blockade the 14 French ships at Toulon as 16, which would require 24 ironclads in the Mediterranean (we had, I think, 7 or 8 in that sea at the time), while we had only 28 all told. He considered that 12 additional ironclads should be built.

Sir John Hay, speaking of battle-ships alone, said, if I recollect rightly, in a discussion in this theatre, that we wanted 28 additional battle-ships, and he put their cost at 27 millions. But there are only 8 battle-ships in the new Government programme.

Finally, in the report on the naval manœuvres published in the *Times*, 21st February, 1889, it is officially stated that "Great Britain is *very far* from being as strong as she should be on the seas." And the committee proceed to give details of the work required to be done, which considerably emphasize the "*very*."

I do not pretend to decide between the conflicting estimates given above, but one thing is absolutely clear, viz., that there is a consensus of naval opinion as to the insufficiency of the fleet, and a very strong body of opinion that the proposed increase is inadequate to bring the fleet up to the minimum requirements of safety; and yet it is at this crisis that we are invited to agree to the proposition that the defense of our naval arsenals and depots by fortification is an exploded error, and that their protection should be left altogether to our all-powerful fleet.

There is also a claim made, the fallacy of which should be noticed; that as the fleet is increased, so the amount of money spent on fortification should be diminished; but since it is admitted that until the fleet is perfect, and indeed after it is perfect, there will always be a possibility of some of the enemy's ships breaking loose, and escaping the blockading squadron of the superior power, it follows that these ships, which may be of most powerful types, and may be found in any sea, can only be prevented from making disastrous raids on dock-yards or commercial ports by the maintenance of *efficient* fortifications kept up to date defensively and armed with effective guns.

2. "No enterprise against an enemy's territory or fortresses is possible within 700 miles even of an inferior hostile fleet, and such an enterprise must always be abandoned if there is the least chance of the loss of command at sea."

Let us look at the facts. The crucial test of the truth of this proposition is stated by Admiral Colomb to be the conduct of the French Baltic fleet during the Franco-German War, which, though it had undoubtedly the command of the sea, refused to risk the simple bombardment of the coast town of Colberg because there was an inferior Prussian squadron (three ironclad frigates) 700 miles away in the Jade. Admiral Bouët-Willamez arrived at Kioge Bay on the 9th August with seven ironclad frigates; he had absolute command of the Baltic, and could have been under no apprehension of interruption by the Prussian ships from Wilhelmshaven, as they were *blockaded there on the 11th August* by a second superior French fleet. Bouët sailed from Kioge Bay to Dantzic, where he arrived on the 21st August, and then returned to Kioge Bay; he passed Colberg both going and returning; why did he not bombard? I have shown that the supposed flanking

fleet was itself blockaded, and therefore was quite out of the reckoning. We must look for another cause, and it is not far to seek. The Germans were already in possession of a material guarantee in France, and, I believe, threatened reprisals if their coast towns were injured, and this combined with the loss of *morale* on the French side, and the evident hopelessness of making any real diversion in favor of France, are quite sufficient to account for Count Bouët's inaction. His fleet was also, it is believed, badly found, in fact, he had every inducement to do nothing. But mark the sequel. On the 13th September, in obedience, I believe, to orders from home, Count Bouët did actually order his fleet from Kiøge Bay to bombard Colberg. Now, at this date, the blockade of the Jade had been raised; the French North Sea fleet had returned to France (on 11th September), and Bouët knew it; the Prussian ironclads were free, and still the French fleet left Kiøge Bay to bombard Colberg. They were overtaken by a storm, and returned without effecting anything; but if the admiral had feared the Prussian flanking fleet, would he have given the order, after Sedan, when all hope of success was practically gone, would he have run this risk, if it were a risk?

I will take another example which I think is to the point. In 1854 the combined English and French Baltic fleets amounted to 18 ships of the line and 9 steamers. The Russian fleet, which retired before them into Cronstadt, numbered 22 ships of the line, 5 frigates, and other vessels. After reconnoitering Cronstadt, and finding it too strong to attack with the means at their disposal, the admirals proceeded to the Åland Isles, and leaving the Russian fleet, which was actually superior in numbers, close on their flank, they, in concert with a French expeditionary force, landed guns and men, and after constructing siege batteries, attacked and took the strong Russian casemated works of Bomarsund. A small force of about nine ships was left to observe the Russians in the Gulf of Finland; but, as I have said, the lighter vessels of the fleet were entangled in the intricate channels between the islands, and guns and men actually disembarked for the attack of a land fortress, in close proximity to a flanking fleet, which not only might, but which it was expected would, sally out from Cronstadt. Can anything be more clear than that the theory put forward of the extraordinary power of the flanking fleet does not hold good universally?

Take now the case of Gibraltar, as stated in Admiral Colomb's paper: The Spaniards "having command of the sea," in 1780, "made a most determined set at Gibraltar," and the place was only saved by its being relieved in 1780, '81 and '82, by the British fleet; or, in other words, the Spaniards attempted an attack upon a strong maritime fortress, though they were in danger of losing, and did actually (on the occasion named) lose the command of the sea, and were driven off by the British fleet; but they returned again and again to the attack, and the place must have fallen into their hands during the absence of the British fleet but for its fortifications.

Professor Laughton, in the discussion on Admiral Colomb's paper, endeavored to show the inutility of fortification by asserting that the fortifications of Gibraltar, which enabled it to hold out, and thus necessitated its

relief, cost us our American colonies, by withdrawing the fleet from America at a critical time; but this argument amounts to less than nothing as against the utility of fortification. The British Government may have been ill-advised in wishing to retain Gibraltar, but they did wish it, and the fortification of the Rock enabled them to hold it, which they could not otherwise have done; the fortifications, therefore, completely fulfilled the purpose for which they were intended, which purpose without them would inevitably have failed.

Then there is the French invasion of Egypt in the face of the hourly fear of interruption by a fleet, which events proved was quite able to hold command of the sea. Nelson left Sicily after the French, and passing them on the way, arrived first at Alexandria, and not finding the French there he sailed north looking for them; the next day the French arrived at Alexandria, and the invasion of Egypt was successfully accomplished. This is a very remarkable case: here is the greatest and most energetic of admirals sailing all round a large hostile fleet without finding it, though the fleets were at one period barely out of sight of each other, and thus failing to prevent the landing of a great expeditionary force, which was risked by Napoleon on this slender chance. It is true the French fleet was afterwards destroyed, but only because they waited for Nelson's return at Alexandria; had they sailed away they might apparently have avoided him as easily in returning to Toulon as they did on the outward journey. And speaking of this very event, Sir G. Hornby asks very pointedly with reference to Nelson's failure to intercept the French fleet, "Are we sure to outdo him?"

But observe what the result of this theory would be, were it established: it would simply reduce the most powerful fleets to complete inaction, even though they might hold absolute command of the sea, and would apparently put an end to naval war. If Count Bouët's action in the Baltic in 1870-71 was paralyzed by the inferior Prussian fleet at Wilhelmshaven, what was the use to him of his command of the Baltic Sea? He could not even bombard Colberg for fear of expending his ammunition, he could therefore have undertaken no other operation which would result in the expenditure of ammunition, and his fleet, though holding command of the sea, was for all purposes of war practically non-existent. The mere statement of this dilemma shows the untenability of the proposition.

3. "A fortified base confers no advantages upon a fleet."

"It does not give freedom of offensive action." In his lecture, and subsequently, Admiral Colomb asserts very strongly that on this point no attempt even has been made to answer him. His argument I understand to be as follows, viz.: a fortified port as base does not give freedom to the defender's fleet, because the port not only requires to be locally protected, but also to have its communications kept open, and as the land defenses cannot admittedly do this, they are utterly useless, and the fleet is just as much bound to the port as if there were no land defenses.

There is here, I submit, a certain confusion of ideas. Admiral Colomb is assuming the possession of a superior fleet, and therefore it will be impossible for the enemy to keep ships continually lying off any of our ports, for the purpose of closing the port and capturing the commerce frequenting it,

and therefore unnecessary for the superior fleet to keep vessels continually on guard for defensive purposes. What we admittedly have to fear is the breaking away of one or more of the enemy's powerful cruisers, who, if there be any important port left undefended, will certainly make a raid upon it, or else a temporary loss of command of the adjoining sea, by some naval disaster. In either case the port attacked will necessarily be closed while the enemy is in the vicinity, and probably considerable damage will be done to commerce, such as was done continually along our coasts in the Napoleonic war. The ports themselves, however, will, if fortified, remain uninjured, and ready as soon as the enemy is again beaten off to resume their *rôles* as naval or commercial harbors; whereas, on the other hand, if unfortified, any superiority established by the enemy, no matter how small or how short-lived, would result, in the case of the naval port, in the destruction of the docks and other permanent adjuncts to the efficiency of the fleet, and in the case of a commercial port, to the infliction of a heavy fine, as well as to possible disastrous destruction of property, and of the facilities for future resumption of commerce. The inevitable results would be, I submit, that our fleet would, if the chief naval bases and commercial ports of this country were undefended by fortification, be greatly hampered in their offensive operations, by the fear of the destruction of these important interests during even a temporary absence.

Take again the imaginary instance of the blockade of Brest. Suppose an enemy's fleet shut up in Brest succeed in forcing the blockade with even one or two powerful swift cruisers, an assumption that I may fairly make, as after Berehaven Admiral Colomb admits, that "judgment must be suspended on the point whether *any* force would be competent to seal up a determined and enterprising enemy." What then would happen? Why the blockading fleet must inevitably return with all speed to protect its threatened home ports, thus releasing the bulk of the enemy's concentrated fleet for any mischief they can compass; while if those ports are secured by efficient local defenses, they may be left in safety to their own resources, and the escaped cruisers to the tender mercies of the cruisers of the superior naval power. I presume, therefore, that in this latter case the blockade might go on without interruption, the admiral being freed from anxiety by means of the fortification of his base.

This view seems to be amply proved by the result of the naval manœuvres; the escape of a few ships from Berehaven obliged the British admiral to abandon the blockade and to return in all haste to endeavor to protect the commercial ports.

But, again, leaving the home islands and the narrow seas, let us take the case of the Mediterranean, and imagine a blockade of Toulon, with an unfortified Malta. What would happen? We must, as is admitted, presume the possibility of the escape, at all events, of a part of the blockaded fleet. Anxiety for the fate of his base at Malta, left to the mercy of an unknown force of escaped vessels, will undoubtedly induce our admiral to raise the blockade, giving liberty to the whole Toulon fleet to proceed on any enterprise it may desire to accomplish, with no certainty whatever that our fleet would catch them again in time; chained as it would undoubtedly be to

Malta, until it was absolutely certain the enemy had gone elsewhere. But with Malta secure against all but an attack in great force, how different would be the feelings of the blockading admiral off Toulon; he could look with confidence on the security of his base and hold fast to his enemy.

Then there is the important question of refitting: Admiral Colomb has stated that an admiral in command of a fleet is just as well off with an open roadstead as a base, and has given as an instance Nelson's operations in the Mediterranean, when Malta was in the hands of the French, to prove this contention. On this point we had a very valuable criticism by Sir Lintorn Simmons, who pointed out that during his period of command at Malta he had particularly noticed the frequency of the repairs which were necessary for the modern war vessel, even when engaged only in the ordinary duties of cruising in time of peace. This is, in fact one of those points where a failure to bring prominently to notice the altered conditions of modern naval war vitiates the entire argument; it is quite possible that Nelson may have got on very well with his wooden fleet in open roadsteads, but how about the modern ironclad? Can it be contended for one moment that her necessities are as easily satisfied as the wooden line-of-battle-ship? In the item of coals alone her wants are incessant and enormous, and she must have a secure depot of supply. She is practically a moving fort, full of the most delicate and intricate machinery, which needs constant attention, and may at any moment need repair which requires the service of skilled artisans and well-found workshops to carry out; her very fabric, though so strong, is infinitely more subject to dangerous injury from modern modes of attack than was the fabric of the wooden liner from the offensive weapons of her day, not to speak of the everyday dangers of tempestuous seas and unsuspected rocks. All these things are against the iron-built ironclad steamers of to-day, and to assert that any open roadstead, selected from its convenience to the locality of the intended operations, will be as useful to a fleet of such vessels as a fortified and secure dock-yard, seems hardly to require refutation by argument.

4. "The possession of maritime fortresses follows the command of the sea, illustrated by the cases of Malta, Gibraltar and Minorca."

It must be observed in the first place that all the cases cited are very peculiar; two of them are small islands, only attackable from the sea, and Gibraltar, being practically impregnable on the short land front, is similarly open to attack only from the sea; and, in the second place, the facts even as regards these do not seem to be as alleged. The Spaniards had the command of the sea, 1780, '81, '82 (I quote Admiral Colomb), but they did not take Gibraltar. Why? Because it was strongly fortified. The French lost command of the Mediterranean in 1798, but we did not take Malta, it only fell two years after, by famine. Why? Because it was strongly fortified. Minorca did change hands rapidly with the alternating command of the sea. Why? Because it was not strongly fortified. But did any maritime fortress not thus peculiarly situated change hands with the command of the sea? Certainly not. We had absolute and undisputed command of the sea from Trafalgar to the end of the war; did the French maritime fortresses fall into our hands? This assertion may therefore be watered down to this very simple and well-known fact, that a fortress which cannot be relieved must eventually

succumb; but to say that this proves that one should never possess a fortress, is hardly a logical conclusion.

5. Again, "Fortresses have never successfully resisted an attack from the sea;" the obvious answer to this is, that we did not even venture to attack Cronstadt; and we failed miserably in the naval attack on Sebastopol; but I understand that Admiral Colomb has explained this away by saying that he meant by "attack from the sea," an attack by troops landed from ships, as, for instance, at Sebastopol; but here, as the attack was purely a land attack, and had no other relation to the navy than that its supplies came by sea, I hardly see what argument can be grounded upon it. We all know and admit that a fortress *adequately* attacked must eventually fall, simply because the superior force, which is capable of reinforcement in men and means, must weary out and destroy the *morale* of an inferior force, which, by the hypothesis is not relieved. This has, however, no bearing on the point now at issue.

6. But the most hazardous statement made by Admiral Colomb is that contained in his letter to the *Times* of 11th March, in which he endeavored to prove the superior durability of ships to forts, with a view to showing the absurdity of spending money upon the latter; and as this letter appeals especially to those who are likely to be equally uninformed as to the technical details of forts and ships, it seems to me to be peculiarly disingenuous.

What is the argument? "The ships built, beside the Martello towers (before Waterloo), lent themselves to the discoveries of science; were turned into steamers and served in the Russian War." Were they really the ships of 1815? While "the Martello towers are all but gone." What, not gone yet! thirty years after the ships have disappeared? I will, however, grant that in their present condition these towers are obsolete, but where are the ships of '54, not to mention those of 1815.

Again: "The steam line-of-battle-ships built of wood at a later date lent themselves to the discoveries of science and the fluctuation of public opinion, and took their place as ironclads, the most powerful in the world. Lastly, the iron battle-ships built side by side with the forts of 1859-60, etc., and now things of the past (*sic*)," are, "the First Lord tells us, in process of being re-engined and re-gunned, so as, after lending themselves to the discoveries of science and the fluctuation of public opinion, to start on another twenty-five years' career of usefulness," while "we are distinctly told that the fortifications of 1859-60 are a thing of the past," and "if we are again to have a fortification outcry, and it succeeds, most of the present works must come down before the new ones can be put up." And this Admiral Colomb calls "*going unto history!*"

What are the facts? I will take the earliest type of fort of the period named, the masonry casemate with iron shield, and point out that this undeniably obsolete work can, for a cost per gun of about 1/10th of the cost of a modern ironclad, be re-gunned and made practically impregnable, not against its contemporary re-engined battle-ship, but against the most powerful ironclad of to-day; while the contemporary ship, though re-engined and re-gunned, and given a new lease of life, will not be an efficient battle-ship

but only a cruiser, a ship of the second class—and this is the *worst* fort and the *best* ship.

Take the continuous iron-fronted forts, as at Spithead; they are as efficient to-day as the day they were built, bar the insufficient thickness of the iron skin; but this was foreseen and provided for, and it only wants the allotment of a sum, moderate indeed as compared with the cost of even one ironclad, to bring the defensive strength of these works up to date, while offensively they are up to date, carrying as they do heavy B.L. guns, a marvelous instance of adaptability in works that were designed for the 9-inch M.L. gun; and they may, in the future, be strengthened up to any required thickness of plating, which is manifestly not the case with a ship. Our re-engined ships will not have their strength increased one bit, only their speed and gun power, and another twenty-five years will finish them, while in another twenty-five years the forts will be in their early youth.

Take next the earthen barbette battery, or that with earth embrasures; these need absolutely nothing but a thickening of the earth parapet, which is neither difficult nor expensive, and the necessary alterations to the emplacements to take the new guns, when such are provided; and even in the re-gunned ships I presume that there will be some necessary alteration connected with the improved armament. These earthen batteries are, too, practically indestructible by time.

Here I cannot help noticing Admiral Colomb's poetic quotation, "Britannia needs no bulwarks: no towers along the steep;" it is absolutely true, and yet it is as misleading as the remainder of the letter. The word bulwark, in the fortification sense, applies to works much used about the fifteenth century, but long since vanished into the same limbo as the "Great Harry." The towers along the steep are, however, more modern, though hardly less obsolete, and Britannia does not want them either; she does, however, want, and I rejoice to think will have, certain sunken batteries along the steep; it is the most favorable situation for such batteries, as the allied fleets found when the Telegraph Battery along the steep at Sebastopol, mounting five guns, disabled six line-of-battle ships and was itself untouched, a fact which, I think, to have been quite candid, the Admiral should have added to his letter.

I have hitherto dealt almost exclusively with the war navy, but it must not be forgotten that the fleet exists for the Empire, not the Empire for the fleet, and that a large part of the duties of the fleet in war will be connected with the protection of the commercial marine. It seems, therefore, not unreasonable to inquire how the defense of certain ports, or harbors of refuge, may affect the safety of the trading vessels, whose safe arrival in our ports is admittedly a condition of our national existence.

It seems to be admitted that it will be impracticable to convoy our trade across the great ocean routes; there, in the open sea, our ships must trust to their speed and the sagacity of their commanders to avoid the enemy's cruisers; but as these routes converge into narrow seas, the conditions will be different, and here it will no doubt be most advantageous, as has recently been pointed out by a distinguished naval officer, to have ports secured by coast defenses, into which such ships can run if pursued, where

they can assemble in security, waiting convoy, if that be possible, through the narrow seas, or waiting for information that the coast is clear for them to make a dash for their destination, or at all events for the nearest fortified port, there to await in safety the next opportunity to move on; such harbors would not have their usefulness limited to the home islands. The foreign coaling stations, to which steamers must converge by the necessities of the case, would likewise, if fortified, afford them a safe refuge while coaling or refitting, if necessary, and would enable them to await in safety a favorable opportunity for pursuing their voyages; and can it for one moment be denied that the existence of such safe refuges for trading vessels, where they might be safely left to the protection of the port defenses, would be of inestimable value to the naval commanders engaged in the attempt to clear the neighboring seas of the enemy's cruisers, leaving them free from all anxiety for those vessels which had run into the defended ports of refuge, and giving them in consequence vastly increased freedom of action in dealing with the enemy?

If, then, Admiral Colomb's conclusions are wrong, wherein lies the fallacy in his argument? It is, I think, twofold. In the first place, the command of the sea claimed for the superior power is an absolute command at all times and in every place, no possibility of weakness or failure is admitted, and that this should be a necessary condition to the successful enforcement of his theory, displays at once its fatal weakness. Perfection is unattainable; the best human arrangements must always be liable to failure from a thousand unforeseen accidents, and that this is peculiarly the case in war has long been an axiom. He has also omitted to notice the practical difficulty; the fleet required to carry out his scheme of defense is manifestly entirely impossible of attainment. I have already shown that the additions now proposed for the navy are by no means sufficient to satisfy naval opinion, and yet as regards even this small installment, an ex-Prime Minister has said in Parliament that he knows no reason for it. What chance is there then of getting the whole naval demand satisfied? But I do not rely on this argument, though it is practically available. I cannot agree that fortification only exists on sufferance because the fleet is weak; if all the money required for the defense of the Empire were voted to-morrow, it would still be folly to spend it all in ships, for two reasons: 1st, because a great deal of the work of coast defense can be much more cheaply done by local land defenses than by ships; 2d, because there is no panacea for all the ills that empires or men are heirs to. A satisfactory defense of the Empire can only be attained by a just combination of all the elements of defensive strength, ships, forts, material obstacles, organization of men. To exalt the value of the fleet, which is admittedly the most important factor, above all the other component parts of the defense, to trust altogether to the first line without supports or reserves, and, above all, to commit the unpardonable sin in war, of undervaluing your enemy to such an extent as to think any possible precaution against his attacks may be safely omitted from your programme of defense, is to fly deliberately in the face of every lesson of history, and to carry the arts of the quack medicine man into the sphere of national defense.

In the second place it is assumed, equally fallaciously, I think, that defeat must also be complete and absolute. This is the basis of the demand for the disbanding of the volunteers as useless on the ground that invasion of this country is unnecessary, because defeat at sea means rapid starvation, and compulsory surrender to any terms demanded by the victorious enemy. I confess that though I do not consider the British fleet to be endowed with a divine invincibility, I have a much higher opinion of its resources than to believe that the dispersion, or even destruction of one squadron, say in the Channel, must necessarily entail the collapse of the whole fleet and the surrender of the Empire, but I do say most unhesitatingly, that such destruction or dispersion may give just the opportunity for invasion, which I strongly believe to be possible, owing to the increased power of transporting troops at the right moment, without waiting for winds or tides, which steam has created. Consider what the prize is, and if a possible invader knew that once across the narrow sea he had nothing more to fear, how enormous the temptation; therefore, I say, with all due respect to Captain Penrose Fitzgerald, organize every defensive measure in its due proportion and in its proper place, and even serve out ball cartridge to the volunteers. "The first shot they fire in anger will," said that gallant officer, "be the death-knell of the British Empire;" suppose we grant even that, for the sake of argument, what will be more likely to defer the firing of that fatal shot than the knowledge that the volunteers are prepared to fire it, what more certain to accelerate the crisis than a suspicion that they have only blank cartridge in their pouches?

What, then, is the *rôle* of fortification? It is only delay, says the gallant Admiral, and this, in a general sense, we may accept; the smallest field obstacle causes delay to the enemy under fire, and so increases his losses, and diminishes his moral force and his chance of ultimate success, the strongest permanent defensive works delay the enemy's attack, say upon a Portsmouth or a Malta, to the extent most probably of deferring it altogether; in either case the effect sought for is produced, and the fortifications have fulfilled the object for which they were created. Between these two extremes there is every variety of development, but the same principle is everywhere involved. The fortifications of the distant coaling station delay its occupation by the enemy's fast cruiser, till she is either compelled herself to retreat for want of coal, or is driven off by a relieving force. But it is said, why spend enormous sums on gigantic works for this purpose? On this point I can only reiterate what I have already said in this theatre, that there is no enormous expenditure taking place, there are no gigantic works being erected, the defenses which are at the present time being constituted throughout the Empire represent an absolute minimum, and strange to say, though all the schemes of defense are the result of joint consideration by military and naval officers, it will, I believe, be found that the naval opinion in cases of difference was generally in favor of more extensive defenses than those undertaken, which were watered down to suit the extravagant soldiers.

Having now, I think, given some reason for distrusting Admiral Colomb's conclusions as to the inutility of fortification generally, and the impossibility

of attack by an expeditionary force upon the British Isles, I will venture to assume the advisability of defense other than naval, and to point out some considerations which bear upon the subject, and first as to our maritime frontier in relation especially to the defense of the home islands; it has been pointed out that a maritime frontier is in its nature very much akin to a mountain frontier pierced by well-defined passes, and impassable at other points: the mountain passes being represented by the harbors, estuaries, or beaches along the coast suitable for the disembarkation of troops; but though apparently similar, there are important differences between the two cases, two of which should be noted, viz.:

1st. The greatly increased facilities for surprise at the point selected for crossing the frontier, which results from the conveyance of the troops by sea in a compact body, instead of by difficult and narrow mountain roads, and this advantage is often combined with that of being able to put troops on shore simultaneously on a broad front.

2d. There is the operation of landing from the transports, which introduces a period of great difficulty and danger into the assailant's enterprise, no matter how successfully it has been conducted up to that point, if this landing has to be made on an open beach; a difficulty depending on natural causes (wind and weather), altogether apart from any hostile opposition from the shore, though it is intensely aggravated by such opposition, while interruption from the sea may convert the difficulty into an impossibility fraught with disaster. Hence the value of secure harbors sheltered from the weather, and offering facilities for disembarkation, to an attacking force.

These considerations seem to me to point to the following conclusions regarding the defense generally, viz.:

1st. The necessity for denying to the enemy, by means of local coast defenses, the use of all harbors or estuaries specially suitable for disembarkation, and conveniently situated with reference to his objective point.

2d. The great importance of a very careful organization of the defending force, and for a thorough system of watching the exposed points, which, as in the case of much of the southern and eastern coasts of England, may be of considerable extent. I must not be mistaken as advocating an impossible defense by a cordon of troops or works, but only such an organization for the conveyance of intelligence, as combined with a careful selection of points for occupation by concentrated bodies of troops, and the intelligent use of railway communication, may insure that any attempt to land a considerable force shall be met with a more or less powerful resistance on the beach. A force attempting to land is never so helpless as during the period of transit from the ships to the shore, and to abandon all resistance at that point, in order to withdraw to positions, no matter how strong or how well chosen in the interior, is, I think, bad tactics. This was Nelson's opinion, and I think he was right, though the difficulty of carrying out such a defense efficiently has, I think, tended to increase since his day. Steam alone has largely contributed to this difficulty, and added enormously to the chance of a successful surprise on an open coast, by rendering the assailant independent of wind and tide for his movements, and also by facilitating the actual landing, by

the use of steam launches, etc., advantages which, I think, more than counterbalance the advantages of rapid concentration conferred by steam upon the defense.

The greatly increased value of the trained and disciplined soldier, as compared with raw levies, however brave, a value which every improvement in weapons tends to emphasize more strongly, tends also I think in the same direction.

Against coast batteries, however, the case is different, and I incline to the opinion that the chances of successful attack from the sea against such works, if properly designed and constructed, have been lessened rather than increased by modern improvements in arms and appliances of war.

Coast batteries must, however, be restricted to those vital points upon which the organization of our fleets and the security of our commerce depend, and must, as to their nature and extent, be directly proportioned in every case to the magnitude of the interests involved, or rather to the kind of attack which the nature of those interests renders probable.

It may be assumed that for us the great military ports (including Malta) are the only ones which require to be defended on the largest scale; the destruction of the naval establishments at Portsmouth would be so severe a blow to the prestige of the Empire and to the efficiency of the fleet, as to make it worth while to attack it in force if weakly defended, though the danger of attack is greatly reduced, if not altogether eliminated, by the existence of strong defenses kept in an efficient condition.

With the commercial ports the case is different: the object to be gained by their capture would not compensate for the risk of valuable ironclads, and in this case, as well as in that of the great majority of the foreign coaling stations, the attacks to which they are exposed will probably be confined to raids by one or more swift cruisers, and the defenses should therefore be designed on a much smaller scale, and will, if efficient, have very probably the desired effect without firing a shot.

Now, as to the nature of the defenses required, they must, in the first place, be permanent works, designed and built in time of peace, for the very simple reason that the mountings of heavy B. L. guns, dealing as they do with excessively violent strains, require for their stability to be so massively and securely fixed, that there is no possibility of extemporizing emplacements for them; and here I must notice the consistent detraction of permanent fortification in articles in the public press, and even in speeches and papers in this theatre. Take, for instance, Captain Stone's opinion "that any elaboration of our complicated systems of permanent fortification is to lose sight of the end in the means," etc., etc., and "a couple of well-placed earthen barbette batteries might do more for the defense than the most approved casemate battery," etc., etc.; but does Captain Stone really think that the earthen barbette battery which he commends is not permanent fortification? And how constantly we hear the cry: "Oh, give us earthworks like Plevna, or like Sebastopol, but for Heaven's sake no permanent fortification." It really seems as if to many persons permanent fortification was synonymous with Vauban's bastioned traces or the so-called

modern French system; whereas permanent fortification means simply works of defense, whether simple or complicated, built of permanent materials, as all works built before they are intended to be used must be, and as all works mounting modern heavy guns must necessarily be. How absurd this cry is may be gathered from the fact that the works now being constructed for the emplacements of the new guns which are being added to our sea fronts, though necessarily permanent, would in every case come under Captain Stone's definition of earthen barbettes, except where there is absolutely no earth available.

The types of works in existence in our maritime defenses may be placed roughly in three classes:

I. The casemated masonry fort with iron shields.

II. The casemated battery with continuous iron front.

III. Earthen barbette or disappearing batteries, for guns mounted either on disappearing or overbank carriages.

Of these brief mention has been already made; and I have shown that while the first is practically obsolete in design, in the sense that it will not be reproduced, it may still be rendered capable of a good resistance to modern guns. While the second, given the additional thickness of plating rendered necessary by the increased power of guns, is as efficient now as when it was originally designed for the 9-inch M. L. gun, and might now be reproduced either in Gruson iron, or wrought iron as in our forts, as one of the possible methods of defending certain limited and exposed sites.

But there is undoubtedly a strong feeling in favor of the third class, and it is a fact that every emplacement now being built throughout the Empire is of this class; wherever the sites are low and B. L. guns are provided, it is combined with a disappearing mounting, and by this means I believe the maximum of defensive and offensive power for shore guns, against ships, is attained. Experiment has actually proved that the chance of hitting a gun so mounted from a moving ship is extremely small.

The system of coast defense, now in favor in this country, is to take full advantage of the power of modern artillery, in order to disperse the guns, both in plan and elevation, without losing the power of mutual support, and also to give them the greatest possible amount of concealment by the use of disappearing mountings, and by the assimilation in appearance of the batteries to the surrounding ground.

The adoption of high-angle fire from heavy howitzers is another feature of the present system which promises good results and fortunately at small cost. There are numerous M. L. guns which, with slight alterations, make efficient howitzers; and since these weapons need not be placed even within sight of the water they command, their emplacements can be very cheaply constructed. It has been proved by experiment that the fire of such batteries, directed by position-finders, will be very formidable to ships whose decks cannot be made strong enough to resist the impact of heavy shells descending upon them at high angles.

The following results have been obtained experimentally, viz., 44 per cent. of hits on the deck of a stationary ironclad at ranges of from 3,000 to 4,000 yards, with angles of elevation of 30° to 70°, and 20 per cent. of hits on

the deck of the *Inflexible* with position-finder, at unknown ranges of 4,200 to 9,900 yards.

The general tendency, then, of modern progress in coast defense has been towards the dispersion and concealment of guns, and a reliance on the effect of flat earth slopes to deflect the enemy's heavy projectiles, rather than on costly structures of iron or masonry intended to resist them by massive strength. Masonry is used in parapets only, where it is impossible to obtain earth, and then in the form of flat slopes of concrete. Advantage is taken of the great range of the B.L. guns to put their emplacements on high sites, in many cases where with the old M.L. guns it would have been impossible, and of the similarly extended range of howitzers, to conceal batteries for high-angle fire altogether from the sea.

Time warns me to touch very briefly on the question of land defenses. It is obvious that the gorges of our great maritime fortresses must be secured from being surprised and taken by a *coup de main*, and this is the more necessary because the modern type of coast battery is itself, as a rule, only slightly defensible against assault from the land side, but the land defenses need not, I believe, anticipate any attack by regular siege, and they may consequently be reduced to the minimum required to resist assault by open force, without any sufficient previous preparation by the fire of siege guns.

Here, again, we are at once met by the cry of "Remember Sebastopol, remember Plevna, no permanent works!" But what is the real lesson to be learned from Sebastopol? Here we see a magnificent defense of a position (the word siege is a complete misnomer) carried out with the assistance of a practically continuous line of earthworks which were constructed by the defenders during the continuance of the attack, which construction was rendered possible by the possession of enormous resources in men and guns and by the genius of Todleben. These works were of very slight profile, it is true, and were not technically storm free in the sense that there was no really insurmountable physical obstacle to assault, but they held out for nearly a year against a vigorous attack. Why? Because they were defended by a garrison so powerful that it was able even to take the offensive, and practically to reduce the assailants to the position of being themselves besieged in their sea-girt position—and from this we are asked to draw the conclusion that this is the best method of defense for a besieged place. Can any reasonable man doubt what a satisfaction it would have been to Todleben to have found the works at Sebastopol, such as they were, ready to his hand, rather than to have been obliged to build them under fire with enormous loss? Can any one doubt that if it had been a real siege, and the place invested, the garrison (any possible garrison) would have been utterly incapable of bearing the enormous strain of this work in addition to their every-day duties of resisting the attack? Can any one, in fact, maintain that it is wise policy to place upon the shoulders of the garrison of a besieged place the enormous burden of constructing the works of defense after the investment is formed, and under fire, instead of having permanent defenses ready to hand, the necessary improvements and additions to which (inevitable in an active defense) will afford more than enough of work for the

garrison? Sebastopol, Plevna, and many other instances, teach us that an active and bold defense may, and will, do wonders even behind the most apparently feeble works; they teach us the inutility of constructing elaborate works *à la* Vauban; they teach us the value of simplicity of design in consequence of the extreme value under present circumstances of the development of frontal fire; they teach us, in fact, the kind of works we require, but I deny altogether that they teach us that the construction of these works should be deferred till the enemy is at the gate, or that there is any inherent disadvantage in having our bomb-proofs built of concrete instead of timber. And mark, this is the only difference between permanent and field fortification. It is an absurd fallacy to say that because Vauban, Cormontaigne, Brialmont, build or have built works of the utmost complication, and of the most elaborate and expensive detail, that we should therefore build no works at all, but should throw upon our raw garrisons the extra duty of doing so in the face of the enemy; and recollect that this is what this senseless outcry against permanent fortification practically amounts to.

Every Continental nation* is as the present moment rushing into iron as the only possible protection of their great fortress guns against the power and accuracy of modern siege trains. Can we suppose that poor and heavily burdened States are doing this in mere recklessness, and without an absolute belief in its necessity; can we believe they are ignorant of the Art of War? We in this country, trusting to our practical immunity from the danger of attack by regular siege on the land fronts of our fortresses, consider that we can do what is required of us with less expensive designs; but I say it is not wise to defer the execution of the simple proposals which are brought forward till it is too late—that the moment of accomplished invasion will be too late, there can be no doubt whatever.

In the case of the existing works we are in most cases fortunate in having them placed sufficiently far from our dock-yards, they having been designed after the greatly increased range of modern artillery was at all events clearly anticipated, and the works themselves have no more than the almost necessary defects of their period. They are much too elaborate and expensive, as well as too commanding and conspicuous, and they lack that abundant provision of bombproof cover close to the parapets which is the first necessity of defense under existing conditions. They are in fact designed as artillery positions, whereas I believe it would be quite sufficient if they were simply constructed as permanent musketry keeps, leaving the artillery defense to be carried out by movable batteries in the intervals, and were of much lower command, and withdrawn if possible from the forward crest of the position to more retired sites. The defense of the forts would then be chiefly a musketry and machine-gun defense, and they would act as strong supporting pivots to stiffen the defense, and to prevent the enemy from reaping a permanent advantage from any temporary success in the intervals between them.

The great power of holding works given to steady troops by the modern

* The Belgian Government have ordered 147 turrets for Liège and Namur. The Germans 60 for Metz and Strasburg. French frontier forts also have cupolas.

rifle strongly favors this method of defense, but it must be admitted that large and efficient garrisons are required; and though this mode of fighting in a prepared position is favorable to the half-trained troops that alone could be spared for garrison duty, it should be very carefully borne in mind that this lack of training must not be allowed to fall below a certain point, and that the more the troops intended for the various garrisons are made acquainted with the ground where they will have to fight, the better will be the chance of an efficient defense.

A regular siege we have not, I believe, to fear, and I will therefore content myself with a simple protest against the acceptance of Vauban's siege, with Q.F. guns thrown in, presented to us by Captain Stone, as in any way representing the most recent ideas on the subject, and I venture to add that the teaching of our military schools seems to me to be largely responsible for this, as well as for the false ideas of permanent fortifications which are, I fear, widely prevalent.

Finally, I must very briefly dismiss the important subject of organization of the personnel, which I had hoped to have treated more fully.

In spite of all the improvements in matériel, there is one factor unchanged. The most powerful ships, the heaviest guns, the most scientific devices for directing their movements and their fire, still depend for their manipulation upon human agency; the man remains the same whether armed with a bow and arrows or a repeating rifle. How will this factor be affected by the marvellous extension of the destructive power of modern appliances of war? What will be the moral effect on a fleet of the sudden destruction by torpedo or submarine mine or a battle-ship of two? What on a ship's company of the bursting of large charges of high explosives between the decks? How will the garrisons, not to speak of the civil inhabitants, of fortresses, maintain their moral tone in the presence of similar explosions? And for troops in the field the strain will not be lessened by the greatly increased efficiency of shrapnel and the use of high explosives. These considerations seem to me to point to the necessity for the highest training, the most perfect discipline, as the necessary preparation for success. For the Navy this training more or less exists. The ordinary life at sea, with its continued struggle and watchfulness against the forces of Nature, itself provides a training for war; but is it so in the land forces? Raw troops will be more and more at a disadvantage in combating with trained and disciplined men, and we depend, and must under present circumstances, continue largely to depend upon troops whom it would be affectation to describe as fully trained.

It is said that we shall fight behind works in some prepared positions; but it will be the business of the enemy to manœuvre these raw troops out of such positions, and to be content with partial efficiency on any such ground seems to be less than common sense. Then there is the necessity, already alluded to, of meeting the enemy on landing. This must be done, if successfully, with trained and fully mobile troops, and under a most carefully considered plan of campaign. We require a carefully elaborated organization, under which every man, fully equipped and fully trained, will move at once into his place on a given signal. Have we got it? If not we are

practically trusting to a single line of defense, even while we loudly assert the insufficiency of that line, and this in the face of Europe in arms.

May I venture to indicate a policy in this matter? It is very simple, and not very expensive. Its cost would consist chiefly in the casting away of some old prejudices. Barrack-square inspection must then give place to real field training, and the officers of the Army must be made thoroughly professional and be more thoroughly instructed. Our present instruction is too bookish, too little practical, and I venture to think, not searching enough. We hold the greatest Empire on earth because we are, or are believed to be, strong enough to maintain it, as it was won, by the sword. The truest word spoken in this controversy is, "A great empire must be strong or perish." Let us rise to the height of this great cause, and choose, at the sacrifice of some luxury—some effeminate longings after universal peace—some distaste for the militarism of the professional soldier—to be strong, not only in ships and forts, but in the thorough organization and training of our forces for war.

John Bull is fond of boasting loudly that he is a peaceful trader, loving justice, mercy, and free trade; that he regrets the necessity for fighting, and pays other people to take that part of the duty of citizenship off his conscience. The rude way in which these mercenaries swagger round the world is painful to his finer feelings, but still he is very generous, and grudges no expenditure in supplying them with the very best of everything required for their calling; it is simply ask and have. One smiles rather sadly at every repetition of this well-worn boast; for at the best it is hardly a very noble sentiment, and, besides, it is not quite true, as those who have to ask this very generous person for money know too well. He is inclined to pay neither in person nor in purse; if this great Empire is not to perish, he must do both.

THE SYSTEM UNDER WHICH FOOD AND FORAGE ARE SUPPLIED TO AN ARMY.

BY LIEUT.-COLONEL GRATTAN,

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IT is the veriest truism to say that the subsistence of an army is a matter of the gravest moment, and yet it is a subject to which I am afraid a great many of us in the British service do not attach sufficient importance.

The Germans consider that "There is nothing which in importance surpasses the subsistence, except the position of the enemy's principal army which we are seeking, the situation of the capital city, or strong place which we wish to take. All other considerations are as a rule much less important."

Every student of military history can recall numerous instances in which the plans and combinations of commanders have been wrecked, or only

imperfectly carried out owing to supply difficulties. The reason why so many of us in our Army do not realize the importance of the subject in so high a degree as we ought, is not far to seek, it is because the administration of the supply services has been in the hands of a purely civil staff. The officers of the Army have hitherto had to discipline, drill, and fight their men, their wants in other respects were provided for by civilians at the War Office, and therefore the officers had no direct interest in the subject. I will revert to this point later on.

I take it that in our discussions, here, we are all actuated by the same motive—the good of the Service; in this spirit I have written my paper, and I trust I have not set down anything calculated to hurt the susceptibilities of any one in or out of the Service.

The following is a brief general outline of the system of supply as at present established :

In peace the arrangements are comparatively simple.

HOME STATIONS.

Consumable supplies, such as bread, meat, special provisions for hospitals, forage, fuel and light, etc., are provided by means of contracts made on behalf of the Secretary of State for War, for periods extending from six months to three years; the shorter periods, embracing such articles as meat, flour and forage. Before the respective contracts require to be renewed, the Secretary of State for War calls upon the general officers commanding districts to forward any amendments they wish to suggest in the conditions.

In complying with these instructions, general officers are afforded an opportunity of suggesting such modifications of the conditions as they may think it advisable to make. The papers are then transmitted to the War Office, where the suggestions are adopted or not, as the case may be, and when the tender forms are finally printed, they are sent with poster notices to the headquarters of each command.

Competition is then invited. For the more important contracts advertisements are inserted by the War Office authorities in some of the London daily papers.

In districts, forms are forwarded to persons considered likely to tender, notices are posted in the town and neighborhood, and advertisements are inserted in one or two of the leading local papers (a list of authorized papers is published in Army Orders).

These advertisements give particulars of the supply required, full information as to how to obtain tenders, and also fix the day and hour by which they are to be deposited in a tender box provided for the purpose at the office appointed for their receipt. In some instances, especially hospital supplies, samples have to accompany tenders.

At the day and hour thus fixed upon, the tenders are opened and scheduled by two officers specially detailed for the duty, one of whom in the case of general Army supplies, is a regimental officer, and in the case of hospital supplies, a medical officer. The schedule and tenders with samples, if any, are then handed to the officer on the general staff administering supply services.

It here becomes the duty of the Adjutant-General's Department to examine the various offers, to inquire into the character and ability of any unknown tenderer, and to ascertain, where tenders are to be accepted on samples of a given standard, that the samples have been carefully and justly examined.

The tenders and all other papers are then laid before the general officer commanding, who, in forwarding them to the War Office, states which tender is recommended for acceptance. As a rule this is the lowest unless special reasons exist for adopting any other course, in which case the grounds for departing from the established rule must be fully explained. Up to this point all the transactions are of a strictly confidential nature. When the recommendation of the general officer commanding has been considered at the War Office, the decision of the Secretary of State for War is conveyed to him, and at the same time the tenders are returned. The contractor selected is then informed, and the parties whose offers have been declined are notified to that effect. The officer commanding Army Service Corps, the principal medical officer in the case of hospital supplies, and the contractors are then furnished with copies of the conditions of contract to guide the future supplies, and copies of the conditions are hung up in all barns and storehouses from which issues are made, for the information and guidance of regimental officers, as well as those of the Army Service Corps.

Contracts generally contain amongst other conditions penal clauses which enable the general officer commanding to make purchases in a contractor's default when he fails to deliver the supplies in the quantity and of the quality stipulated for in the agreement.

In making these purchases in default, it almost always happens that expenses over and above the contract rates are incurred, and such loss falls upon, and is recoverable from, the contractor. The popular idea that good supplies cannot be obtained if the lowest tender is accepted is therefore a mistaken one. So long as a tenderer is in a pecuniary position to carry out his agreement, there can be no legitimate bar to its acceptance, provided he is not on the black list. Any system of picking and choosing amongst contractors would open the door to the grossest fraud and jobbery.

The black list, it may be explained, is a register kept at each headquarters of a district, of contractors who have been guilty of a breach of the conditions of some previous contract they have held.

If any one will take the trouble to consult the great manufacturing companies, he will find that in their contract for raw material, they follow the same system with regard to the acceptance of the lowest tender, but, they obtain their supplies from producers, and not from middlemen.

MEAT.

The condition for quality runs as follows: "It shall be well fed, good, sound, sweet and wholesome. The beef shall be ox, not under two and not more than eight years old, or heifer and cow's, not under two nor more than four years old; the mutton, wether or ewe—carcasses of sheep weighing more than 80 lbs. will not be received unless the contractor consents to remove the surplus fat."

This I contend is a superior description of meat to that usually eaten by artisans, and the more respectable working men, as cow and bull beef form a considerable percentage of the supply in the butchers' shops frequented by the humbler classes.

BREAD.

This must be: "Sweet, well made and properly baked, and be made from flour which is clean and free from grit, the produce of good, sound, sweet, and dry British or foreign wheat, in proportion of one-third of white, to two-thirds of red wheat, without any adulteration whatever."

When bread is baked by the Army Service Corps, as at Aldershot, the quality of flour contracted for is as follows: "The flour for the ration bread to be that known as London No. 2, or its equivalent, the produce of good, sound, sweet, and dry wheat, without any adulteration whatever, and to be of a quality that will produce at least 92.4 lb. loaves per sack of 280 lbs.

"The flour for hospital bread to be the produce of good, sound, sweet and dry wheat, without any adulteration whatever, of the quality used for hospitals, and such as will make the best household bread."

These produce palatable, nutritious, and thoroughly wholesome bread.

A great deal has been said and written about the inferiority and insufficiency of the soldier's ration, but if he gets articles of the quality prescribed by the conditions of contract, I contend that the charge of inferiority falls to the ground.

With regard to the insufficiency of the ration, if the soldier only received the bread and meat allowed him free it would be insufficient, but his pay has been fixed on a scale to enable him to supplement the public allowance by a messing contribution.

This system is not, perhaps, the best that could be devised, but it has worked fairly well, wherever attention has been paid to the expenditure of the messing money. For my part, I think it would be better for the State to supply the soldier with his entire food, even if his pay had to be reduced by the amount of his messing contribution.

The authorities could obtain the articles at a cheaper rate, and in greater variety than can be done regimentally, and the soldier's meals and meal hours could be regulated in whichever way experience showed to be best.

This would have the effect of establishing a uniform system of supply for peace and war; at present we only give the soldier about two-thirds of his food in peace, and we have to enter upon an entirely different system when we take the field.

The messing money is the soldier's own, and he naturally thinks he should be allowed to spend it as he thinks fit, this I find is the great bar to making any real reformation in the system of messing. It is a great many years since I served in India, but if my memory serves me aright, the men were there provided with their entire ration, and the system worked well.

In connection with this question I think we should try and accustom soldiers to what they get on active service, by occasional issues of the entire field service ration in peace, and we ought to teach them how to cook it in a palatable manner.

When biscuits or preserved meat are issued now, quite one-third of them

are thrown away, whereas with a little ingenuity it would be easy to make a very savory mess of them.

Field service cooking is not our strong point, and an effort should be made to improve it. A military pamphlet on cooking of about a dozen pages published by authority would have an infinitely better effect upon cooking than the individual efforts of commanding officers.

I may say here, parenthetically, that chemical analysis tells us the exact proportions of carbon and nitrogen absolutely necessary to enable the soldier to carry on, but I cannot help thinking that some element has been left out of the calculation, else how can the Zulus manage to march long distances, and to fight upon a few mealie cobs? How can the East Indian subsist and work hard upon a few handfuls of rice and a little ghee? Or how can the West African negro live upon a few balls of kanki? Whilst his brother in the West Indies feeds chiefly on yams and salt fish seasoned with a little oil.

At Aldershot, Chatham, Shorncliffe, and the Curragh Camp we have baking and butchery establishments, where the contracts are for live cattle and flour, instead of for meat and bread as is the case at Woolwich, Colchester and other stations. At Chelsea and most stations abroad we have also commissariat bakeries.

These establishments are managed entirely by officers of the Army Service Corps, the cattle are slaughtered, and the bread manufactured by soldier butchers and bakers of the corps.

The primary object of these bakeries and butcheries is to enable us to keep in a state of practical training both officers and men of the Army Service Corps.

The soldier, too, benefits by these establishments, as he gets a much better ration where this system is followed, than at those stations where bread and meat are supplied under contract.

The extension of these bakery and butchery establishments to Woolwich and other large stations is worth consideration, as they would be the means of providing the soldier with better rations at an economical rate, and would afford further opportunities for the officers and subordinates of the Army Service Corps to keep themselves acquainted with this section of their duties.

They could also be made available for the instruction of such regimental officers as might take an interest in acquiring a knowledge of supplies.

HAY.

The prescribed quality is "that it shall be good, strong, sweet, dry, and clean, and may be English meadow hay, clover or mixture, and not of the same year's growth till after the 1st day of October."

I know of no article about the quality of which there is such a diversity of opinion as there is about hay, and yet it admits of no more real doubt, than that two and two make four.

I have here a sample of first crop hay (*i. e.*, the first crop off land after it was laid down for permanent pasture) which was rejected at a barn.

Sample No. 2 is one of good meadow hay, that was also rejected, whilst

No. 3 is a sample of poor soft hay off worn out land, that had been fed down, which was accepted.

This sort of thing frequently happens when inexperienced officers are on duty, and it is one of the greatest difficulties we have to contend with, as it encourages contractors to tender inferior hay, in the hope that it will pass.

Here are also several samples of the various classes of hay, which come up to the contract standard, but an examination of them will show how varied they are, and this probably accounts for the diversity of opinion amongst officers who have not had any very extensive experience in the subject.

Another point, concerning which there is a great deal of misconception, is the nutritive value of various grasses.

Certain works dogmatize upon the subject; their authors apparently overlook the fact that grasses of the same name and kind exactly, may possess highly nutritive qualities if grown on one soil, and be of low feeding value when grown on another.

Hay should be judged by its growth and general character, and not by one or two particular qualities.

OATS.

These should be "good, sound, sweet, dry, and thoroughly cleaned from stones and dirt, without any admixture of foxy or mow burnt oats, and shall weigh not less than thirty-eight pounds per imperial bushel."

Some think that thirty-eight pounds per bushel is not a high enough standard of weight, but we have to give the horse food of a quality sufficient, but not more than sufficient, for the work he has to perform, and taking the horses at Aldershot as an example, I think it must be admitted that the service ration of oats is enough to keep them in good condition, under ordinary circumstances.

With regard to the service ration for both man and horse it should be remembered, that it is not a case of giving the best food that can be obtained to either soldier or horse, but only such good, sound, and wholesome food as is necessary to keep them in health, and meet the waste entailed by their work, and in the man's case I have no doubt if his messing contribution was deducted from his pay and administered for him, that his food would be ample; purchases of tea, sugar, and coffee would be made from brokers, and the other articles would be got direct from producers, at advantageous prices, on account of the large quantities purchased. I believe we could provide as good messing as he gets now, at $\frac{1}{4}$ d per day less than it costs him.

With regard to the horse, my experience shows that 8 lbs. of oats will keep horses in good condition, if their work is not of a severe and prolonged character. The horses of the Army Service Corps depot company, at Aldershot, received this ration for three months during the present winter, without losing condition, and worked nearly five hours per day for six days in the week, the horses of the Service companies were also cut somewhat less than 1 lb. of their oats per day each, and there are now some 19,000 lbs. of oats standing to the credit of the corps, for issue during the

time the horses will be employed on field columns, or other severe work during the summer.

STRAW.

The quality prescribed shall be "good, sweet, clean, and dry, in trusses, or bales. That for forage shall be wheat, oat, or rye."

It will be observed that barley straw is not included in the description to be accepted. By excluding it, we limit our source of supply, and therefore enhance the price we have to pay. I have frequently heard it urged against barley straw that it leads to skin diseases and encourages vermin. I have nothing to state against this view, except that many years ago, when this description of straw was included in the contract, I took it in preference to the other kinds, as one fourth extra was allowed, and bedded the horses of my company upon it continuously for ten months, and I had not a single case of either skin disease, vermin, or any other complaint attributable to the straw. Eight pounds per day, per horse, is somewhat more than is absolutely necessary. If any person doubts this I would ask him to go to one of the manure pits in camp, or barracks, when it is being emptied by the contractor, and I have no doubt he will see that the greater part of what is being carted away is quite fit for litter. The reason for this waste is, that it gives the men too much trouble to carry it in and out of the stables.

As the conditions of contract clearly define the quality of supplies to be provided, there should not be any excuse for receiving inferior rations, especially at such stations as Aldershot, Woolwich, Dublin, and the Curragh, and other places where there are organized supply establishments, and daily mixed boards of inspection. It is at small out-stations where the great falling off in quality is more likely to take place, because the inspection is necessarily entirely in the hands of regimental officers, the majority of whom, from no fault of their own, have not sufficient technical knowledge of the subject to detect the numerous devices resorted to by unprincipled contractors.

Now that facilities exist at Aldershot for regimental officers to acquire some practice in the method of judging provisions and forage, it is to be hoped that all who can do so will avail themselves of the opportunity. The subject is by no means an uninteresting one, and both soldier and horse are benefitted when their officers take an interest in, and become acquainted with, the quality of the rations that should be provided.

It is necessary, however, to remember that a double responsibility rests upon officers inspecting supplies, first, to see that the supplies are of the prescribed quality, secondly, not to insist upon anything better than the prescribed quality, for if they do, the fact is made known among contractors, and the result is that the prices of the succeeding contracts fly up, sometimes to a very serious extent, and the public is thereby injured.

I have detailed the methods generally followed for procuring supplies in peace, but for a few articles such as: Preserved meat and compressed forage for occasional issues, wines and spirits, tea and sugar, for hospital use, contracts are entered into by the War Office direct, and the supplies are delivered in bulk at the Reserve Supply Depot, Woolwich Dockyard, and are thence distributed to stations, on demand.

There is a double object in this system, first, the troops are supplied with articles at an uniform good quality, and secondly, we have at all times on hand at the Reserve Supply Depot, a large stock of these stores ready to meet sudden and emergent mobilization of troops for active service.

At foreign stations the only difference in the system is, that general officers commanding accept tenders on the spot, and obtain covering approval from home afterwards.

FIELD SERVICE.

All important supplies for field service, such as biscuits, preserved meat, tea, coffee, sugar, cheese, bacon, pickles, jams, etc., together with medical comforts, are mainly supplied from the Reserve Supply Depot at Woolwich, but much power is of course necessarily vested in the general officer commanding the forces as to procuring fresh provisions on the spot by purchase, and he is thus charged with a duty in which neither he nor his officers have had any practise in peace.

Lime juice and rum, if not obtainable from a naval establishment, are also supplied from England.

The foregoing is an outline of the general principles on which Army supplies are procured.

The system is followed at the present day, and has been in existence for many years, with one slight innovation introduced at Aldershot last year. At that time, owing to the high prices asked, there were some suspicions that the forage supplies had got into the hands of an organized ring. The authorities, on the recommendation of the general commanding the division, sanctioned the purchase of hay and oats in the open market, and this led to such good results that we are still supplying our wants at Aldershot, in the way of oats, by purchasing them from time to time in the London Corn Market, direct from the brokers, and consequently at first cost.

The success of this departure from the established rule naturally leads one to ask why the practice of making direct purchases should not be adopted in all cases possible?

It should be borne in mind, that in almost every instance, the contractor is a middleman between the producer and consumer, so that the War Department loses at least one profit that might be saved.

Moreover, the contractor's profit is enhanced by the careful mixing of articles of inferior quality with those of a better class, as for instance, mixing light, worthless samples of oats with heavier grain—supplying bull, or cow beef, etc., etc.

To obviate all this we should have a purchase branch for supplies, similar to the Army Remount Purchase Department; an expansion of the Staff of the Reserve Store, at Woolwich, would meet the case.

The necessary information concerning the requirements of different districts should be rendered to the Purchase Department by means of weekly states, and purchases being made in the bulk for delivery, it would be a simple matter to arrange the distribution.

It would not be possible, in a paper of this description, to fully elaborate

a scheme for carrying out these ideas, but to my mind the thing seems very simple.

Another point in favor of this plan is, that if officers had to make direct purchases in peace times, it would educate them to such questions as cost, quality and the customs of trade, which they are often brought into contact with for the first time when on active service.

With regard to contractor's profits, we must take trade morality as we find it, and bear in mind that contractors enter into agreements for the purpose of making money, and that in the case of consumable supplies which are delivered one day, and frequently used the next, there is every inducement for an unprincipled man to supply articles of the lowest quality; if they pass he makes a large profit and there is no evidence left against him; if rejected, he probably brings them up again on the following day, and, on this account, it would be better for inspection duty to be taken by officers weekly, as it would in a great measure check the tendering of rejected supplies.

The period system of contracts is objectionable, as contractors must cover themselves against the chance of losses by enhanced prices owing to bad seasons, strikes, etc., and therefore we do not obtain our supplies on the most advantageous terms.

There is no doubt that certain of our stipulated conditions are calculated to deter producers from having anything to do with our contracts; they prefer to sell at a price to middlemen, who take all the risk and trouble of getting the articles passed.

Whilst the feeding of troops in peace is comparatively simple and easily managed, their subsistence in war is a matter of the gravest difficulty.

There are four methods of supplying an army in the field: first, by magazines; second, by quartering, or billeting, on the inhabitants; third, collecting supplies by the troops themselves; fourth, by requisitions on the magistrate, or other local authority.

From the nature of our wars, the magazine system is the one generally adopted.

Large shipments of supplies are sent out from England, and a magazine is established at the base of operations, from which, as the troops advance, smaller magazines or depots are established, and fed by means of convoys.

It is the system with which our commissariat has the greatest acquaintance, and I think it is fairly well understood, to the extent of feeding from twelve to fifteen thousand men, but I am afraid that our arrangement of magazines would not answer for a large body of troops occupying an extended front.

With regard to the other three systems which I am about to refer to, we have very little practical acquaintance with them, and if any officers here have been present at any of the great continental wars, or manœuvres, I hope they will be kind enough to give us the benefit of their observations on the subject, and in connection with this, I trust the authorities will see their way to allowing some officers of the Army Service Corps to attend continental manœuvres in future, with a view to ascertaining the method of supply adopted by different armies.

Regarding the system under which convoys of provisions are arranged and conducted, time would not admit of my touching upon it, further than to say that it is second to none of the supply questions in importance, and I recommend the study of it to officers who have not already thought upon the subject, they will find much to learn in connection with it.

QUARTERING ON THE INHABITANTS.

The reserve of food in any given place bears a proportion to the population, and therefore the number of troops quartered in any town or district should be in proportion to the number of inhabitants and the nature of its products.

There would be no use in quartering 10,000 men upon a population of 2,000, neither would it be wise to send a large body of cavalry into a manufacturing district.

The French in the Revolutionary War, and under Napoleon, calculated that in a moderately peopled country they could subsist an army of 150,000 men for one or two days, within such a space as would not interfere with its concentration for battle. It followed, therefore, that by continuous marching they could feed such an army without magazines. Upon this system they over-ran Europe with very little except what they obtained from the inhabitants, and without ever being in want.

Under less favorable circumstances, such as a sparser population, the district being of a manufacturing character and not agricultural, or if the country had been occupied by an army already, the results would not have been so successful. Still, by increasing his front, a general would probably command a sufficient tract of country to supply his wants, without scattering his troops beyond the power of rapid concentration, so long as he keeps on the move, but if he has to suspend his march, distress must ensue, unless arrangements have been made to meet the contingency.

The arrangements are, first, to have a supply column organized that would carry three or four days' rations, and to make each soldier carry three days' rations on his person.

The second is, to gather provisions from distant localities, so that it may be possible to change at once from the system of quartering on the inhabitants to that of the magazines.

The former is, of course, infinitely the best, as hardly any transport is required, and it is done in the shortest time.

We now come to collecting supplies by the troops themselves.

This plan cannot be well carried out with larger bodies than a division, as the officers superintending the collection have neither the time nor the means to ascertain and take possession of all the provisions stored in any house.

Moreover, transport would seldom be available in such cases.

Where this system has to be resorted to, is in the case of troops close to the enemy, such as advanced guards and outposts, because no preparation can be made for such bodies. It can also be used by movable columns working independently, and in all cases, where through an accident or oversight there is no opportunity to obtain supplies by other means.

BY REGULAR REQUISITION.

We have it upon the authority of a great German writer that this is the simplest and most efficacious mode of supply, but it must be supplemented to some degree by magazines.

He says: "In all assemblies of troops in their own country there is no difficulty in subsisting by regular requisitions—neither is there, as a rule, any difficulty in retrograde movements.

"On the other hand, in all movements into a country of which we are not in possession, there is very little time for such arrangements, seldom more than the one day, which the advance guard is in the habit of preceding the army.

"With the advance guard the requisitions are sent to the local officials, specifying how many rations they are to have ready at such places, as these can only be furnished from the immediate neighborhood, that is, within a circuit of a couple of miles round each point, the collection so made in haste will never be sufficient for an army of considerable strength, and consequently, if the troops do not carry with them enough for several days they will run short.

"It is therefore the duty of the commissariat to economize what is received, and only to issue to those troops who have nothing; with each succeeding day, however, the embarrassment diminishes, that is to say, if the distances from which provisions can be procured increase in proportion to the number of days, then the superficial area over which the contributions can be levied increases as the squares of the distances gained.

"The direct execution of these requisitions is enforced by detachments placed under the orders of the official functionaries, but still more by the fear of responsibility, punishment, and ill-treatment, which, in such cases, like a general weight, presses on the whole population.

"The result to be derived from a common sense view, which the experience of the wars since the French Revolution tend to confirm, is that even the largest army, if it carries with it provisions for a few days may undoubtedly be subsisted by contributions, which, commencing at the moment of entering a country, affect at first only the districts in the immediate vicinity of the army; but afterwards, in the course of time, are levied on a greater scale over a range of country always increasing, and with an ever-increasing weight of authority.

"This resource has no limits except those of the exhaustion, impoverishment, and devastation of the country."

I understand that in their later wars, the Germans in many cases adopted the plan of exacting money contributions in lieu of rations in kind, and with it purchased the necessary supplies; several advantages are claimed for this plan, the principal of which is, that the discipline of the army does not suffer in the way it does when supplies in kind are collected, and it eases the strain on the magazines.

The British commissariat officers have had practically no experience in the art of collecting supplies from the civil population, since the days of the Peninsular, and I think a plan of education in this particular line should be laid down.

All continental nations have their supply systems carefully elaborated, the Germans especially have laid theirs down to the minutest detail. I regret time will not admit of my giving an outline of the various plans, but the following tables show the scales of rations for men and horses in the armies of the undermentioned countries.

GERMANY.

The forage ration in the field is as follows :

Description.	Oats		Hay		Straw		To whom Issued.
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	
Heavy Ration.....	13	12	3	4	3	4 $\frac{1}{2}$	Horses of General & Staff officers.
Light Guard Cavalry Ration.....	12	0 $\frac{1}{2}$	3	4	3	13 $\frac{1}{4}$	Engineers, Artillery, & Transport.
Medium Ration.....	11	13	3	4	3	13 $\frac{1}{4}$	Guard Dragoon & Guard Hussars.
Light Ration.....	10	15	3	4	3	13 $\frac{1}{4}$	Lancers Regt. of the Line.
Guards du Corps Regiment.....	14	13 $\frac{1}{2}$	6	8 $\frac{1}{2}$	3	4 $\frac{1}{2}$	All other Troops and Officers.

AUSTRIA.

The daily ration of forage for horses is divided thus :

	Oats	Hay	Chopped Straw	Litter Straw	
	lbs.	lbs.	lbs.	lbs.	
Officers Private Horse.....					
Adjutant's Govt. ".....	8 $\frac{1}{2}$	10	..	2 $\frac{3}{4}$	
Military Train Riding Horse.....	10 $\frac{1}{2}$	7 $\frac{1}{2}$..	3 $\frac{1}{2}$	
Cavalry or Artillery Riding Horse.....	10 $\frac{1}{2}$	10	..	3 $\frac{1}{2}$	
Artillery Draught Horse.....	10 $\frac{1}{2}$	12	2	3 $\frac{1}{2}$	
Military Train ".....	10 $\frac{1}{2}$				

RUSSIA.

The daily ration for horses in war is :

	Oats		Hay		
	lbs.	ozs.	lbs.	ozs.	
Guards, Cavalry and Artillery.....	16	1 $\frac{1}{2}$	13	0 $\frac{1}{2}$	
Line Cavalry, Artillery and Engineers.....	12	15 $\frac{1}{2}$	13	0 $\frac{1}{2}$	
Train Horses.....	13	12	13	8	

FRANCE.

The issue of forage in war time and on board ship is governed by the classification of the horses as follows :

Classification of horses.	War time.			Green Food.			On board Ship.				
	Hay	Straw	Corn	Green Food	Straw	Corn	Hay	Barley	Barley Meal	Bran	Water
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Galls.
Artillery Horses, draught, and saddle (officers and men) and horses of Train officers.	8.82	4.41	12.35	110.23	5.51	6.61	7.72	5.51	3.31	1.10	3.52
Cavalry of the Line, Engineer and Infantry Officers' horses, also horses of Officers of sanitary and admin. services.	8.82	4.41	10.38	99.23	5.51	5.51	6.61	4.41	3.31	1.10	3.52
Light Cavalry.....	6.61	4.41	10.47	88.19	5.51	4.41	5.51	3.86	3.31	1.10	3.52
Arab horses and Mules attached to any Arms.	6.61	4.41	9.92	88.19	5.51	4.41	5.51	3.86	3.31	1.10	3.30

ENGLAND.

The following are the daily issues of forage for horses in the United Kingdom :

	Oats lbs.	Hay lbs.	Straw lbs.
If in quarters.....	10	12	8
If in encampments.....	12	12	Nil.
If employed on draught work.....	2 lbs. oats extra.		
MULES.			
Mules of 15 hands and upwards, employed on heavy draught work.....	10	12	8
Do. if in encampments.....	12	12	Nil.
Smaller Mules.....	5	10	13
Do. if in encampments.....	6	12	Nil.

Daily scale of rations issued by the Greater Continental States to the soldier :

Articles.	England		Germany		France			Austria		Russia		Remarks.
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	drms.	lbs.	ozs.	lbs.	ozs.	
Bread.....	1	4	1	10½	*2	3	4	2	0	2	11¾	lbs. ozs. drs. *Bread, Table 1 10 7 " for Soup 8 13 Total.. 2 3 4
or												
Biscuit.....	1	0	1	10½	*1	9	14	1	4	1	13	
Meat (fresh or salt).....	1	0		13½		10	9		10		7½	*Biscuit, Table 1 3 6 " Soup 6 8 Total.. 1 9 14
or												
Preserved Meat.....	1	0		8½		7						
or												For cooking. For eating.
Bacon.....				6								
or												
Ham.....											3½	*or 2 ozs., 2 drs. Dried Vegetables.
Tea.....		½		½							20	
Coffee.....		½		½			9				14	
Sugar.....		2		2			13				3½	For cooking. For eating.
Salt.....		½		½			9		¾		10	
Pepper.....		½		½					½		10	
Vegetables (fresh).....		8							2½		20	*or 2 ozs., 2 drs. Dried Vegetables.
or												
" (compressed).....	1	0			4½		*1	1			¾	
Rice or Groats.....											7	*In lieu of meat.
Dripping or Lard.....											5	
Flour.....											1½	
or												*In lieu of meat.
Potatoes.....									2		8	
or												
Peas.....											5	*In lieu of meat.
Tobacco.....											1½	
Salt Pork.....					*8		7					

We should educate our officers, not merely in the detail work of judging supplies, and accounting for them, but they should be taught to know the population, products, means of transport, and general character of roads of the different districts in each country, they should know the monetary systems, the weights and measures, the market value of the different articles of produce, and the prices of animals. This may seem a wide field of information, but we need it, and I am convinced that it is possible for officers to acquire it, if we had an establishment at Aldershot of the character of a Commissariat Institute, divided into sections, each section to comprise every detail connected with the supplies and transport of a particular country.

We should have models of the different kinds of vehicles and pack saddles in use, showing their carrying capacity, a description of the draught animals generally used, samples of the different kinds of food stuffs for men and horses, district maps, and all other information required by Army Service Corps officers.

In this establishment each officer could receive a thoroughly professional training, so that no matter what part of the world his services might be required in, he would have a knowledge of the circumstances under which he would have to act.

Any Army Service Corps officer will tell you that one of the greatest, and most pressing wants of the corps is a series of text books, and a systematized plan of professional education similar to that in force for every other branch of the Service. There are lots of material for the purpose, scattered it is true, but a valuable compilation could be made in a few months.

When completed, every step should be tested under conditions as nearly resembling those of active service as possible; this could be done at Aldershot, working up from the supply of a regiment, to that of an Army Corps.

A knowledge of languages is imperatively necessary to a commissariat officer.

Our present school is not established on a broad enough basis, we teach officers to judge the quality of the individual articles of supplies, field baking and butchering, the system of accounts, and our general method of supply, but we are wanting in all the higher and more extended branches of professional knowledge.

It seems almost incredible, but it is true, that when an officer of the Army Service Corps proceeds to a foreign station, at which he has not previously served, he does so in ignorance of everything connected with its supplies and transport. We have no text books, or other sources of information to consult upon the subjects in relation to the Colonies, and half our period of foreign service is passed in gaining the information which we should be possessed of before we quit England.

CONCLUSION.

I will now conclude with a few remarks upon the system under which Army supplies were until recently administered, as, from my point of view, it was to the defects in that system we have to attribute all our failures in war, and much of the wastefulness in our expenditure.

At the time of the Peninsular war, appointments to the commissariat were objects of parliamentary patronage, in later times, its officers were nominated by the Treasury, and until a comparatively recent period, they were empowered to correspond direct with the Treasury and War Office.

In the commissariat regulations published so lately as 1845, its officers were directed "to report as often as may be necessary, the manner in which the commissariat service has been executed in reference to the 'military operations in progress,'" and this rule was in force until the establishment of

the Control Department, even under that organization the controller had a position independent of his general. The outcome of this system was what might have been expected; the civil authorities had no conception of military requirements on active service, and the generals in command were checked and thwarted at every step, through the well-meant but obstructive interference of the civil administrators.

The Duke of Wellington in writing about the Commissariat of his day, said: "The existence of the army depends upon it, and yet the people who manage it are incapable of managing anything out of a counting house," and by his retirement from Spain in 1809, through want of supplies, he exemplified the truth of his own assertion. He was heavily handicapped indeed, as in addition to the civil administration, his executive officers were also civilian.

There are still many officers in the army who can remember the horrors of the winter of 1854-55 in the Crimea, when from want and privation, brought about through the absence of forethought on the part of the civilians forming the Treasury Board, we had, on the last day of February, 1855, out of a total strength of 30,919 men, no less than 13,608 lying in hospital, and during a period of seven months from October 1st, 1854, to the end of April, 1855, out of an average strength of only 28,939, there perished 11,053 men, of whom 10,652 died from sickness alone. The executive commissariat officers did their duty with great zeal and devotion, but they could not counteract the inherent defects of the system.

I need not refer to anything nearer the present time, but I take it there are few of us who have been on active service who could not point to instance after instance in which troops suffered through defects in the administration. Nothing else could be expected; we had a civilian staff to prepare in peace for the requirements of war, with which they had no practical acquaintance, and general officers suddenly called upon in war to supplement the inadequate preparation of the civilian staff, by making arrangements, of which they had had no opportunities of acquiring a knowledge in peace. In this way, the element of divided responsibility was introduced, and it was practically impossible to bring home to any one the mistakes and blunders that were committed.

It is not possible for the civilian to grasp all the difficulties that beset a general from start to finish of a campaign; seen only through the medium of correspondence and returns, everything seems easy and simple to the civilian mind, and we cannot have our supply and other services in a really effective condition until the funds voted by parliament are handed over to the Commander-in-chief for allocation and administration. The military authorities can then take the necessary steps to provide the Army with supplemental services proportionate to its requirements, instead of being trammelled and hampered by a civilian staff, owing allegiance to a parliamentary head, the exigencies of whose political position makes it necessary for him to view the efficiency of the army, as entirely subordinate to the requirements of his party, in the House of Commons.

The civilian check may be maintained, but it should be confined to one of audit, there should be no power reserved to question any expenditure approved by the Commander-in-chief.

There should, however, be an office of first audit under the Commander-in-chief, his auditors should be retired officers who have served at the various stations, as local knowledge is absolutely necessary to the proper audit of accounts.

In connection with the evil results that follow the want of knowledge of military affairs on the part of Army administrators, I beg to quote from a military writer of great eminence who says: "As long as we have no personal knowledge of war we cannot conceive where those difficulties lie of which so much is said, and what that genius and those extraordinary mental powers required in a general have really to do. All appears so simple, all the requisite branches of knowledge appear so plain, all the combinations so unimportant, that in comparison with them, the easiest problem in higher mathematics impresses us with a certain scientific dignity. But, if we have seen war, all becomes intelligible, and still, after all, it is extremely difficult to describe what it is brings about this change, to specify this invisible and completely efficient factor.

"Everything is very simple in war, but the simplest thing is difficult. These difficulties accumulate and produce a friction which no man can imagine exactly, who has not seen war. Friction is the only conception, which, in a general way, corresponds to that which distinguishes real war from war on paper.

"The military machine, the Army, and all belonging to it is, in fact, simple, and appears on this account easy to manage. But let us reflect, that no part of it is in one piece, that it is composed entirely of individuals, each of which keeps up its own friction in all directions.

"Theoretically, all sounds very well; the commander of a battalion is responsible for the execution of an order given, and as the battalion, by its discipline, is glued together into one piece, and its chief must be a man of acknowledged zeal, the beam turns on an iron pin, with little friction, but it is not so in reality, and all that is exaggerated and false in such a conception manifests itself at once in war.

"The battalion always remains composed of a number of men, of whom, if chance so wills, the most insignificant is enabled to occasion delay, and even irregularity.

"Activity in war is movement in a resistant medium.

"Just as a man in water is unable to perform with ease and regularity the most natural and simplest movement, that of walking, so in war with ordinary powers, one cannot even keep the line of mediocrity."

It is the want of knowledge of the friction referred to by this writer which renders the administration of military affairs by civilians inefficient.

The administration of Army funds by a civil staff must necessarily be wasteful, as its members are unable to assess the relative military importance of the various items of expenditure, and are as likely to sanction an unnecessary service put strongly before them, as they are to refuse one of pressing necessity.

There is no doubt that the lottery-like character of the arrangements, which rendered it doubtful whether what was asked for would be granted, refused, or cut down, fostered a tendency to estimate for more than was

needed, and in the absence of an efficient professional check, it is certain there has been much ill-directed expenditure in the past.

It is vain to hope that soldiers will pay much attention to economy at the behest of civilians, who have no disciplinary power over them, and to whom they owe no allegiance, whereas, the wish of the Commander-in-chief is sufficient to induce every officer to exercise care and attention in the expenditure of public money.

I think that when the Commander-in-chief's estimates have been submitted to parliament, and the funds have been voted, there should be no interference with his freedom of action; he knows the Army and its requirements, and the country must trust him to spend the money in the manner best suited to safe-guard British interests.

Any savings on a particular year's estimates should be carried forward to the credit of the Military budget, to meet the exigencies of future years, instead of being absorbed by the exchequer.

In connection with this part of the question, I had a conversation a short time ago with one of the partners in a great international banking firm, in order to ascertain the objections people in his position would be likely to raise to it. He saw none from the constitutional point of view, but he was afraid it might lead to place making, the danger of this, however, would be no greater than it is at present, as the estimates would of course be submitted to the cabinet, before being laid before parliament, full explanation could be asked for before any fresh appointments or places were made.

DISCUSSION.

Colonel J. NORTH CREALOCK—The Chairman has invited discussion, but there is not much to discuss. Colonel Grattan's remarks seem to me to be confirmed by my own experience. I never understood the duties connected with supply, etc., properly, till I found it out on active service. Theoretically you learn it at the Staff College; but it was only in South Africa that I began practically to find out what Treasury rules and regulations meant. My experience there was what he describes regarding the dual system.

We had able Commissariat officers and we got on very well on the whole, but I felt we were being spied and reported upon all the time, for letters were continually going home. It was certainly very kind of the Commissary General, for he generally used to read his remarks to me before he dispatched them. He was on good terms with us, but it might have been otherwise, and it was possible for us to have our characters stolen away behind our backs. You can see where Colonel Grattan's sympathies are. We may agree a general should be hanged if anything goes wrong; but he should not be hanged unless he is really responsible.

Now the regulations, so far as I understand them, are different—who can be responsible?

My experience of the present system is that what is done is thoroughly looked into by men who know full well where the shoe pinches in regimental life; and if anything is done you have the satisfaction of knowing that it has been put forward by officers who have been in the same position as yourselves. There was a danger of some laxity in the former system, and I have known a Commissariat officer in his desire to be kind and do what he should to help the contract branches who has not absolutely carried

out his duty ; the sympathy and desire to assist will no doubt be found in the future, but we will hope the laxity, if it existed, will disappear.

The lecturer's observations on the system of contracts shows that we are at the present time saving a considerable amount of money, and I hope it is not done at the cost of good forage, but I am afraid some of you will say it is so.

Colonel Grattan suggested the establishment of an institute for instruction in his branch of the Service. Probably our energetic honorary secretary will be able in a short time to let us have models or drawings of wagons, camels and other animals used in different countries for the purpose of instruction. I am, however, afraid that what Colonel Grattan asks is more than we can get, though no doubt our institution here could assist him to a very great extent.

Colonel Grattan has exhibited before you a rather nice little cottage loaf, and no doubt what has been going on here for the last six or seven months is an improvement in bakery. Other details, in all of which matters Colonel Grattan has been so ably assisted by Colonel Richardson and Major Stevens.

From what I can hear from officers commanding regiments, improvement has taken place in regard to the food of the soldier, but if he believes the soldier is inclined to hand over part of the $4\frac{1}{2}$ d. for any further improvement, I think he is a little more sanguine than I am. I should go further and give them 1s. a day and their rations, the same as in India. It would be more satisfactory to the men and all concerned, it would simplify accounts, and in this respect I think the captains of companies will agree with me, although the finance authorities will not.

Lieutenant-Colonel T. DAVISON—I think every one will agree that we have had great difficulty in the matter of hay, and I don't think an officer will be likely to get the chance of passing any hay above the standard—certainly, lately it has not been above it. I think we might cut off some of the hay and give more oats, or a proportion of Goode's Food, because it is very bad for horses to get bad hay.

Major E. T. H. HUTTON, D. A. A. G.—One point I am sorry the lecturer did not touch upon was the question of a portable forage ration of compressed forage or forage cake, and also the emergency ration referred to in the Field Army Tables, and which I believe has not yet been decided upon. I cannot help thinking that these two questions, viz., the compressed forage ration and the emergency ration are both well worthy of comment and consideration. Colonel Grattan has brought forward again the question of the adequacy of the soldier's ration. This subject was very carefully discussed and threshed out by Dr. Davis not long ago in a lecture delivered here, and by the statistics he obtained, and a good many of us went thoroughly into the matter ; it was pretty well decided that the present ration was not adequate, and that the bread ration was deficient. It was shown by statistics in one brigade that there was a quarter of a pound of bread less per man than the amount actually required by the men. Colonel Grattan alluded to cooking on service and the instruction which should be given to the soldier in cooking. I cannot help thinking this is a matter which deserves an even greater amount of consideration than has been usually given to it. The best of meat may be issued to the troops, but unless the cooks and the men of companies in a campaign know how to make the best of it, it is impossible to prevent waste. I cannot help thinking that the cooking of the Army generally might be improved by the establishment of a School of Cookery for the Army on a much larger and improved scale than that which exists at present. It would also, I think, be of advantage if the men were instructed how to make "chapatties," dough boys or flour cakes out of the raw Commissariat flour. Upon two campaigns in which I have served, flour has been often issued to the men because there was no biscuit available and no means of making bread. Of course the flour proved absolutely useless. I recollect especially on

three or four occasions during the Zulu Campaign in 1879, the bread ration was issued part in biscuit and part in flour. Had this been done in India, "chapatties" would have been made. But in this particular campaign there were no means of doing this and no knowledge on the part of the young soldiers how to use the flour, and the consequence was that it was thrown away unused. As regards the messing money, I think it is a question if the soldiers are consulted, whether they would like to part with it. I rather think they like to have their messing money and the expenditure of it in their own hands, with power to make use of it in their own fashion.

THE CHAIRMAN—I think that my brother officers are all agreed that this is a most important subject.

I would like to remark, first, as regards the British soldier in time of peace, that it is of the first importance to make him comfortable, happy and contented, then in time of war, if you feed him properly, clothe him well, and keep him amply supplied with ammunition, he will fight anywhere. But it seems to me that if you do not feed him well he cannot be expected to fight well, perhaps after a long march on an empty stomach.

I speak with some diffidence on this point, as I have not been so fortunate as some of you as regards active service.

At the present time, in Aldershot, I believe that the soldier is uncommonly well fed at all events. I speak from some experience, as I get exactly the same at my house as a soldier gets.

As regards the butchery and bakery, I have had the opportunity afforded me without any notice of inspecting them, and I can only say that such compare most favorably with similar institutions in civil life. Thanks to Colonel Grattan and his officers.

The question of the forage issued at Aldershot is one I know of considerable discussion. I can only say that as regards the R. E. forage barn, though I have seen the forage occasionally indifferent, I have never found it bad, especially during the last few weeks it was most difficult to find fault. The oats, in my opinion are good and the hay sweet and of good quality. If we could always ensure getting forage of this quality for our horses I think there would be no reason whatever for complaint. On the other hand, the straw is certainly inferior, leading unquestionably to much waste.

The lecturer spoke of the advantage of a knowledge of requisitioning for supplies and I am in hopes, as I am sure were all of you, that we should have got a great deal of information on the subject of the supply of food to an army in the field. It does seem to me of the highest importance in time of peace that officers should be trained as far as possible in this very important subject, and I, like many others, would be glad to join such a class.

Colonel Grattan advocated keeping down the amount of oats. It might be safe up to a certain point, but it should never be lost sight of that unless a horse's feed is continuous he is likely to go on for some time without showing much signs of work, and then all of a sudden, perhaps at a critical point, breaks down.

Colonel DAVIDSON—It has been suggested to reduce the oats in certain cases to 8 lbs. I had a letter from the Commander-in-chief in Ireland in which he states that he had seen a cavalry regiment using 8 lbs. of corn per horse per day. The result you could anticipate by the thinness of the horses. I think if horses are to do any hard work it would be better this year, considering the quality of the hay, to give them 12 lbs. of corn at the expense of some of their hay, but certainly not less than 10 lbs. When you have 424 horses to about 680 men in a corps, and remember the number of recruits you have to drill, you must not think of reducing the amount of corn.

Lieutenant-Colonel T. BURNETT, R. H. A.—Colonel Davidson deprecates reducing the oat ration, and I agree with him. There was an experiment made with a battery of R. H. A. at St. John's Wood, where they do less work than here, and I believe the experiment was very soon abandoned. The commanding officer was very much opposed to it on account of the fact that the horses fell off a great deal. I don't know whether Colonel Grattan alluded to the reduction of the corn ration for draught horses or riding horses, but we must remember that the former have very much bigger frames to support. I think it inadvisable to reduce the corn ration.

Colonel KEYSER, Inspector of Army Signalling—I think Colonel Grattan's suggestion as to extending the education and training of men in the Service in cooking and baking an excellent one.

Quite recently Sir Frederick Roberts has ordered, when practicable, that the European soldiers should cook their own rations, and when in compliance with this order I discharged all the native cook boys, I had the greatest difficulty in supplying their places.

It is always difficult for a commanding officer abroad to find trained cooks, and I therefore agree with the proposition that the soldier's training in this respect should be greatly extended.

The LECTURER—With regard to the portable forage rations alluded to by Major Hutton, I don't know anything that has ever given entire satisfaction, but I believe if Goode's Dried Food could be put up in rations, it would serve every purpose as an emergency forage ration. It is undoubtedly the most nutritious and sustaining of the many forage rations I have tried.

Goode's Compressed Food is very good as an ordinary service ration, but I think it should have a great proportion of the dried food in it.

With regard to Major Hutton's remark as to the insufficiency of the bread ration, I find that with 700 men of the Army Service Corps in mess at this station, the average quantity of tea bread bought is 40 lbs. per week, or .13 of an oz. per man, per day, but my men do not divide the bread in rations; each mess eats from the common stock.

In the school of cookery two men only per regiment can be trained per annum, and this is quite inadequate for the wants of the Service, and, therefore, we need some plan of general instruction to be laid down by authority, which commanding officers could insist upon being carried out. If a dietary system was drawn up as the result of experiments and plain instructions issued for carrying it out, our cooking would be much improved. Without something of the sort, I am afraid a marked general improvement cannot be hoped for.

We have given Colonel Burnett's system of messing a very fair trial lately, but the men would not have it, and it had to be given up in about a month or five weeks. I liked the innovation, and some of the more sensible amongst the men did so, but because it was an innovation and savored of an interference with the spending of their messing money, the men generally would not adopt it.

For this reason, amongst others, I think it is necessary that the State should supply the soldier's entire ration, so that his dietary and meal hours may be arranged to meet the requirements of his health, and not be left in a great measure to his own caprice, as at present. Under existing circumstances nothing is provided for the men between 4 in the afternoon and 7.30 the next morning; I have tried hard to get them to take their tea after stables, but they won't.

With regard to deducting messing contribution from the men's pay, I made inquiry among them and they all seemed to take to the idea. I put it to each man plainly as a question, and after thinking for a few seconds, each replied in about the same terms: "It would be simple, and as we have to pay the money, we might as well have it

stopped at once"—one intelligent fellow added, "and the Government would be able to get the things cheaper, and would get us more for the money." About the issue of meat, I may remark that the men get the animal from the neck to the hind quarters. It is issued from the Commissariat Store, nothing whatever is allowed in or out of that store except the free meat ration allowed to warrant officers, non-commissioned officers and rank and file.

The officers get their meat from a different store altogether, and as they cannot always get exactly what they require, I sometimes hear complaints from them. I had a letter from an officer who said that from his own observation he found that his men were far better served than he was, (laughter) I wrote and told him that was a most satisfactory state of affairs.

As regards inferior hay, I think it is a point on which we should ask officers to exercise a little business tact and discretion. We cannot expect hay like that of 1887 from seasons like 1888.

Concerning oats, I don't propose cutting down the ration. Speaking from my own experience as a Transport officer, I find the animals are not so hard worked in winter as in summer, therefore it is possible to form a reserve for the period of hard work. On the whole year the ration is not too great, but I think the system of giving one uniform ration when the work is not uniform is a bad one—I am quite certain that by attention to feeding in the late autumn, winter and spring, we could save enough oats for extra issues in summer to keep the horses from being so fine drawn as they frequently are at the end of the drill season.

Lieut.-General Sir E. WOOD—If you had a purchase Board would you not lose the advantage of the experience we gain in purchase?

The LECTURER—Yes sir, if one set of officers only were employed, but the purchase officers could be frequently changed; or, officers might purchase in districts on account of the Reserve Depot. I should like to say, after the remarks of Colonel Bruce Brine, that the depot is open to any of you to see, from 5 A. M. till 4 P. M., and we are only too glad when officers take an interest in the subject of rations, as we know the more the matter is looked into, the sooner will certain prejudices be got rid of. It is under the care of Major Graham, and the credit for its regularity and cleanliness is due to him.

LETTERS ON INFANTRY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by COLONEL R. H. HUGHES, Inspector-General U. S. A.

VI.

COMPANY DRILL.

YOU have entirely misunderstood me if you have concluded, from my having expressed the wish that our regulations might be changed, that I was somewhat indifferent to exactness and precision in drill. The very opposite is the case. While I favor the doing away with drilling and inspecting battalions, as such, in the manual in wheelings, etc., yet I would wish, at the same time, that these things might be carried on and looked after with still greater exactness inside of the company organizations. In order that the details of the regulations might be followed with increased

exactness, I would have everything cut out that is not of strict utility, and then I would have them carried out to the letter in the smallest units. Our elementary drill might then be completed in the company instead of in the battalion as hitherto. Since the change in battle tactics brought about by improvements in fire-arms, we no longer operate by battalions, but by companies, as will be seen by examining the maps of plans published in the works of the General Staff. The company has become the actual tactical unit, although for convenience and administration, we still reckon by battalion, because a company has too little fire-power to last, and melts away too quickly in action. It is necessary therefore that the greatest attention should be given to the careful instruction of the company, while the drill of the battalion already passes beyond elementary tactics, and must always encroach more or less upon the province of applied tactics.

I have always held that company drill was much more deeply concerned with the "how" than with the "what," while in the drilling of a battalion the reverse is the case. In war, a company chief very rarely finds an opportunity to make great tactical or strategical evolutions. As a rule, his objectives are very clearly defined, both in defensive and in offensive operations. But within his immediate zone of activity, the result of the action may depend upon how he executes his designs, how his men avail themselves of the advantages offered by the terrain, how they conceal themselves, how they shoot, if they promptly obey the signals or commands to advance, to lie down, sighting, manner of firing, etc., etc. The more dependent the decision at the crisis of the action may be upon the spontaneous activity of individuals, the greater the need of discipline, *i.e.*, of spontaneous obedience, which unites the independent exertions of many individuals as a whole for the accomplishment of a common purpose. It has only been a short time since we experienced a proof of how all inventions of our day, the breech-loader, mitrailleuse, and rifled guns are as nothing against the primitive arm, the spear, if the troops are without discipline. I refer to the destruction of Baker's troops at Suakim. It cannot be maintained that the Egyptian troops are wanting in courage. The troops of Mehemet Ali and Ibrahim of the first half of the current century have established the contrary.

Therefore, I hold it to be necessary, that from the company up, the correct execution of commands should be insisted upon. The obtaining of this state of things will take all the care and diligence that should be demanded of a company chief. I cannot approve of the ingenious tactical evolutions in company drill. It is not unusual to see fancy movements that would never be applicable in actual combat. A fight may be represented in which one platoon occupies the enemy in front, a platoon is also sent to each of the flanks, and an inclosing movement is executed, for which the battle of Sedan furnishes the general idea. But this supposes an amount of indifference and neglect upon the part of the enemy, that will never be found in actual service. Thus erroneous impressions are given, the natural results of representations of actions during peace that would be entirely impossible during actual warfare. An attempt will be made, at least in the first engagement after hostilities open, to employ the same tactics that have been drilled during peace. If the result does not meet the expectations, it is a

failure. The "Turk" must be banished from our company drill-books. "Turk" is a name given by a witty comrade to such ingenious manœuvres as are only executed on smooth ground or in the drill hall.

It is true that an attack on the flank has an incalculable effect. I have witnessed it myself, repeatedly, in actual war, not only in large masses, as at Koniggratz, when we came on the flank of the Austrian line of battle with the second army, but also in small combinations. For example, at the battle of St. Privât. We were engaged for hours in a waiting artillery action against the enemy's position along the height of St. Privât-Amonvilliers. Upon the slope in front the enemy had pushed out battalions deployed as skirmishers, who caused my batteries so considerable loss that the commanding general sent me six companies of infantry for my protection, these were posted by platoons in the intervals between the batteries for the purpose of preventing the enemy's skirmishers from making a rush upon the front of the batteries such as our skirmishers had made at Koniggratz on the Austrian line of artillery of Chlum-Nedelitz. But the French skirmishers remained at from 900 to 1,000 paces distant and they were able to inflict more than the ordinary loss upon our batteries, because our needle guns would not admit of firing at individual men at that distance. The gallant infantry regiment Augusta, repeatedly asked to be allowed to move forward and relieve us of this annoying *vis-a-vis*. But my orders were to keep up a waiting fight. This infantry would have been greatly outnumbered and its advance would have masked my batteries, so that I should have had to stop their firing, and I was under the necessity of preventing this inopportune attack several times. Finally, Major v. R. suggested the idea to me of shoving a company forward along a swale in the ground on the enemy's left flank. As this movement did not mask my batteries I authorized it.

Scarcely had this company (Captain v. A.) opened fire upon the prolongation of the enemy's skirmished line, when the whole line sprang up and sought safety in ascending the slope. We now saw for the first time what considerable masses of the enemy's infantry had lain concealed in the furrows in dangerous proximity to our line. We estimated the force at nine battalions which had been lying there in three lines, one behind the other. Our shells caused great loss to this mass as it fled up the slope. As good luck would have it, the forward movement against St. Privât followed almost immediately upon this episode, and my batteries found the field in their front clear of the enemy, and were able to push forward at rapid gaits to the heights on the right of St. Privât. Thus a single company, by suddenly opening fire upon the enemy's flank, had caused nine battalions to retreat. Such flank attacks have a magical effect, mainly due to the idea of a threatening evil which takes possession of the enemy, when he is suddenly and unexpectedly struck in this manner.

This can only be accomplished when either the line of advance leads directly upon the flank of the enemy, or when the terrain is cut with swales or depressions that have not been observed by him, and which can be made use of in approaching his flank. Cases will seldom occur when the command that executes the flank attack will be less than a company. The company making the flank attack itself makes a frontal attack.

Every company should aim to attain such efficiency in instruction as will enable it to make a frontal attack in exact accordance with the regulations, with minor changes of front, with reinforcing the firing line, with withdrawing part of the force from the line engaged, and in good fire discipline and dexterous manipulation of their weapons. As I have previously stated, this will give the company chief enough to do during the drill season if he succeeds in doing it thoroughly. (This should not prevent any company chief from taking advantage of accidents in the terrain at manœuvres and in war to gain the flank of the enemy and to strike the enemy in flank with the front of his company, which has been so excellently instructed in the manner of making frontal attacks, rather than to attack along the enemy's front.)

Every infantry officer knows how difficult it is to teach the soldier to use his piece dexterously. It is not enough that the soldier knows what he must do with his piece, no, he must be so instructed that he will execute the right thing instinctively, without thought. I will only mention the manipulation of the safety pin in the cocking and uncocking of the piece. When a sportsman wishes to fire he raises the hammer of his piece without thought, mechanically. So with the infantryman, if he wishes to fire he must mechanically cock his piece, carefully and without a jerk, and after the command "cease firing," he must carefully secure his piece again. He must be conscious of the condition of his piece at all times and know whether it is loaded or not without the necessity of looking at it. He must aim mechanically and without thought; he must be so schooled that he will not do otherwise than pull the trigger slowly and without jerk.

I am sorry to say that drill masters are not rare who are guilty of looking more to the rythm of the manual, to the audible click, with which every motion ends (and with which the drill sergeant would have "eyes left" executed), than upon a dexterous handling of the pieces. But even with the very best instructor, it is a long time before the correct manipulation of the piece becomes a second nature to the man. He must practice it hundreds of thousands of times. But it is necessary that it should become a second nature to him, in order that he will execute the motions mechanically when his mind is occupied with the thought that his life is in danger. We cannot expect him to do much in the way of thinking.

The same may be said concerning fire discipline. I have often experienced proof of how much the fire discipline is shaken when men are in danger of losing their lives. Well instructed troops not only fail to aim, but they fail to shoot, and only snap their pieces. Before I had ever seen a battle old veterans had assured me that it was an evidence of a certain degree of instruction if, in the heat of action, the men raised their pieces to their shoulders to fire. In the battle of Koniggratz I was an eye witness of an uncontrolled fire in which the pieces were held perpendicularly and discharged in the air. I galloped forward in advance of my batteries in order to find a position closer to the enemy to which I might bring them up. As I reached the rise, accompanied by my sergeant-major, a number of adjutants, orderlies, musicians, etc., I found myself within twenty or thirty paces of a detachment of the enemy, amounting to about half a battalion of infantry,

which had just vacated Chlum on our right and was retiring upon Wedelitz on our left, and had thus thrust itself in between our infantry and my artillery line. They were as much surprised as we, and mistook the group of ten or twelve mounted men for the commander and staff of a menacing cavalry attack; at least they opened an aimless fire. I saw very plainly that most of the shots went straight up into the air. One man aimed and shot the horse of the sergeant-major in the body just as he turned, for we few mounted people could not accomplish anything with our sabres against five hundred well armed infantrymen, and we hastened back to our batteries in order that they might pursue this infantry with their fire.

But how much more difficult it is to secure obedience to commands and signals in the excitement of action than when it only concerns firing at a designated target; to use a certain elevation of sight; to determine the kind of fire (volley or by file); to cause the fire to cease; or to know in file firing the exact number of cartridges used, etc. Every one who has seen a single action-firing exercise on the drill ground knows that, without giving exact obedience to the commands and signals, the effect of our expensive infantry must be *nil*.

Many things have been done to simplify the management of the piece. One of the most noticeable is the flattening of the trajectory which admits of firing with but one elevation by aiming at the feet of the enemy at short ranges when the violence of the action makes any other course almost impossible. If, however, as I have previously stated, a certain degree of fire-discipline is necessary in order to have the men bring their pieces to their shoulders when they fire, how much more will be necessary to get them to aim at the feet of the enemy.

In many other respects the excellent and comprehensive course of the firing school at Spandau makes great demands upon the self-possession of a man much excited by the action going on about him. I would mention especially the rapid firing, also the limiting of the number of cartridges to be used and the periodical "cease-firing" when at close quarters with the enemy. It is asking very much of a man, upon whom an enemy is firing, to demand that he shall delay returning the fire for any considerable time. While serving in the artillery I have experienced on several occasions how difficult it was to silence the fire, when it became necessary, in order that the smoke might clear away sufficiently to allow us to observe our shots. A fire once begun easily escapes control if not governed by an iron discipline. How much more must this be the case in the infantry when the number of individuals engaged in firing are so much more numerous. It is very natural and human that the soldier should find a certain gratification in the noise made by the discharge of his own piece. The more undisciplined the man the more he is inclined to keep up his courage by shooting. In my first campaign I was present at a light action of a reconnoitering party after which the lieutenant in command examined the cartridge boxes of his men. The old people had expended three, four, or five shots, the recruits averaged over twenty each. When such experiences are taken into consideration it causes us to doubt whether the command "fix cartridges, quick fire" will find observance in an action at close quarters, say

under 300 metres. This command, or signal, has crept into our Service since our last campaign. It has not yet been tried in actual war.

The skirmish volley is another kind of fire discipline that has been introduced into our Service since the last War. Looking at it as an artillerist it seems to me very advantageous thus to hold the fire of the infantry in hand so that it can be made to act as a concentrated force—a well directed battery. This kind of fire has shown itself quite satisfactory at manœuvres when the number of cartridges to be used during the day were to be limited to from ten to fifteen per man, and when the smallness of the charge used in manœuvre ammunition made but little noise. But when used in large quantities in a sham battle it was very different. In this mass of people the noise of the ammunition was so great that it was necessary for the officers to exert their voices so much in order to be heard, that before the ending of the manœuvre they had become so hoarse that no one could understand their commands. This is indicative when we consider that a platoon in open order occupies a greater frontage than a company in close formation, and that lieutenants are dismounted officers and are unable to overlook the whole line with the same ease with which the mounted company chief or battalion commander can look down on it.

The designating and consequent observance of the application of two or three different sights, as has been recommended for certain conditions, is still more questionable. Occasions will rarely occur when time can be found for the proper execution of this recommendation. Besides, this point is not of importance, inasmuch as the application of different elevations (sights) are only recommended for the longest ranges, when firing is the exception rather than the rule. It is only when compact bodies or deep columns enter the danger zone that resort should be had to these measures, for example, when troops are advancing over a bridge, etc. These are exceptional cases, and not of a deciding character.

Although the theoretical speculations emanating from the firing school are very valuable, and have been of much benefit in exciting study of our arms and of infantry fire, yet they carry in themselves the danger that they may lull us to sleep in illusions during peace, the brushing away of which, when the moment of trial comes, may cause discouragement.

It seems to me that a skirmish line, which, while heavily engaged still pays so much attention to the sharp skirmish-whistle of the lieutenant that it ceases firing in an instant, glances at him and yields immediate obedience to his signal to spring up and rush forward, or to his command to change its target or sight, shows evidence of a very high degree of fire-discipline. Too many artificialities should not be introduced, but it is necessary that the time should be devoted to the repetition of simple movements hundreds and thousands of times, until they become second nature to the men. Not until then can we depend upon their being applied in the face of the enemy. In war all is simple, but the simple is difficult, says Clausewitz.

My wish, that the drill of the company should be confined to the simplest and most elementary things, and that tactical and strategical manœuvres

should be avoided, need not prevent its following some tactical idea; it should smell "of powder and lead," as some one has put it. On the contrary, I would much prefer that every company chief should drill his company as long and as often as possible, just as he would if he were acting against an actual enemy after he has brought its instruction up to such a degree of perfection as to warrant such a course. He can and should relieve the monotony of the march in going to and returning from the drill ground by moving in some fighting formation, and he should come upon the drill ground in some probable action formation. Upon the march opportunities will frequently present themselves for representing here a skirmish, and there an attack, and the balance of the march can be employed in giving the men some idea of the manner of performing security service on the march. Time is thus economized, and time is valuable. I secured good results in the way of instruction in field service in my division from an order requiring that the troops of the command should move in fighting formation with an underlying tactical idea on all marches of whatever kind, whether simply to the drill field or in making changes of station.

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by MAJOR W. L. HASKIN, U. S. A.

VIII.

HOW THE ARTILLERY LEARNED TO FIRE.

YOUR second question reads "Why did the Artillery in 1866 have to its credit such a small percentage of effective shots; and how did it happen that so soon after this war its effectiveness was so greatly increased?"

In replying I must be permitted to recall to your remembrance the manner in which in former times artillery target practice was conducted. I suppose that during the time that you passed at the War Academy you had occasion to take part in one of these practice firings, but if I am mistaken in this it will suffice that you compare the *Dispositions de Revue* in force in the time of smooth-bores with those of 1869 and 1870.

These *Dispositions* contained all the special rules concerning the exercises of a brigade on its practice ground and the entire course required five weeks and a day to complete.

As it was not possible for all the light batteries and the fortress artillery to practice at the same time, some of them executed other manœuvres or were employed in artillery construction while others used the range.

If you study in these *Dispositions de Revue* the distribution of the time to the various exercises prescribed for a battery you will find that they begin by devoting several days to what was called the "Fire of instruction," at the different distances with shot, shell, shrapnel and canister. Then

followed a manœuvre called "Test firing at known distances;" then another called "Test firing at unknown distances." One day was given to the firing for the prize. At the end of the period of instruction one or two days were devoted to what was called "Firing for information and for study," and four days were occupied by the inspection which was made by an inspector general or an inspector. Of these four days there was one in which there was target practice.

Consequently a battery fired eight or nine times in the course of these five weeks and had besides an occasion to witness firing during the "Firing for information and for study."

This last manœuvre included the execution of different experiments, either to make known to the troops those inventions of the artillery commission believed proper to introduce into the Service or to be experimented with to see if they were practicable, or again to show something unusual which had been imagined by the commission established in view of this exercise. All the officers and non-commissioned officers were present.

There were four targets for field artillery. One for the firing with shot which was fifty paces long and six feet high; one for practice with shrapnel representing a column and consisting of three similar targets placed at twenty paces one behind the other; one for canister practice having the same length but a height of nine feet to represent cavalry; and, finally, a field work of which the greater part was simply traced upon the ground, the remainder having but a slight relief.

These targets remained in the same place not only during all the period devoted to target practice but, in part at least, for years, for behind the target for practice with shot a bank was raised in order to recover the projectiles used. As to the redoubt, it was added to from year to year. The targets for practice with shrapnel and with canister only, were established when they were to be used but they were seldom set up because they were not thought to be needed.

The distances at which the firing for instruction and the test firing at known distances were conducted were furnished in advance, by the inspector general, if I am not mistaken, and they were measured accurately with a surveyor's chain. They were indicated by pegs placed a hundred paces apart, having the distances marked upon them.

It is true that these pegs were removed for the practice at unknown distances, so that the battery ordered to advance, to illustrate some tactical theme, and directed to open fire upon a designated point should begin by estimating the distance. But all those who had used the range would know so exactly the distances between the different firing points and the permanent targets that it very seldom happened that errors were made in this respect. If they were made, it was a matter of general astonishment.

This exercise of firing at unknown distances was therefore illusory, and the results obtained were of no more value for instruction than those given by the firing for instruction and the firing at known distances. For these the distances were not only accurately measured and fixed, but the elevation which should be given was indicated with exactness. The attempt to

obtain the elevation with great exactness was seldom made, however, for the fire of the old smooth-bore was very inaccurate. Correction for this inaccuracy could only actually be made by firing many times with the same piece, now short, now over, and the allowance of ammunition was not great enough to permit of doing this with each piece.

It would happen also that, even if a piece were accurately elevated for 1,200 paces, its shot would fall short or go over and possibly not strike the target at all.

It was perfectly natural then that little importance should be attached to accurate pointing, and that the attempt to obtain the range by trial shots was very seldom practiced, in fact, was only attempted with shrapnel or when shells were fired at high angles. This practice at range finding, even when executed at all, was not instructive, for markers were stationed in the vicinity of the targets who signalled whether the shot went over or fell short, went to the right or to the left. No gunner, therefore, learned to judge of the effect of his shot by means of his own personal observation only, and the degree of importance attached to the effect of the firing was not nearly so great as it is at present.

It is true that after each target practice the battery was taken to the target in order that the men should be able to form a general idea of the effect produced, but under this system it was impossible to criticise the measures taken by each piece in particular and its method of obtaining the range. The holes in the target afforded no information by which to determine whether the measures adopted by the several pieces were well or badly executed. A general idea of the effect produced by the firing was obtained, that is to say, it was shown that at a certain range such a percentage of hits upon a target of such and such dimensions could be counted upon, and it was very easy to deduce the conclusion that at smaller targets, such as cannon, skirmishers, supports, etc., the number of hits would be very small indeed. At the same time the conclusion was reached that the manner in which the piece was served made very little difference in the result, and it is not surprising that the opinion should be almost universal that in an artillery action the essential thing was to continue firing steadily, accident alone determining the number of effective shots.

On the other hand, artillerists were convinced by what they saw at target practice in former times that a mass of artillery approaching to the short distance from the enemy at which it was the custom to begin firing with canister, should make great haste in coming into battery, for if it halted at 400 paces from the enemy's infantry the latter could, in a minute and a half approach so nearly as to destroy it with its fire. If its opponents were cavalry and made a resolute charge, the batteries would be overrun in half a minute.

The greatest importance, therefore, was attached to the rapidity with which a battery moving to the front could open fire. A really overwhelming effect was supposed to be produced only by canister. Shrapnel fire was then still considered to be of doubtful effect,—a minimum, compared with the certainty which this fire actually possesses. This is why it was absolutely required of the artillery that it should be in a state to produce an intense

effect by its canister fire one-half minute after it was ordered to open fire to the front. Of course, the general, or other superior officer who inspected the battery which was executing its target practice took for his criterion, having his stop-watch in hand, the time which elapsed between the command, "Halt, Action Front," and the first shot fired. You doubtless remember that this was usually a little more or less than twenty seconds. On the occasion of the annual manœuvres the time required for this was considerably less, and the foreign artillery spectators could hardly believe their senses when they saw a horse battery advancing at the top of its speed open fire almost at the moment of halting. But whoever had good, quick, sight and rode a well-trained horse that would permit him to lose nothing of what took place during the furious gallop and the apparent confusion at the time of coming into battery would easily see that the battery had loaded its pieces before moving, although this was forbidden by the regulations, and that the piece which obtained the prize (for the captain gave a premium when the inspection was one of those which was of special importance), that this piece, I say, was fired while the cannoneers still held the trail, and before it had fairly reached the ground.

You can very well see that under such conditions there was no question of aiming, or of hitting a target if the gun were loaded with projectile. You can see, too, that a very rough manner of handling the pieces was necessarily one of the results of this, and that it could not but be prejudicial to the effect of the fire, and was soon the cause of accidents, for it could happen that the cannoneer who pulled the lanyard should do so in the hurry while the piece was being brought about, and while it was still directed toward one of the other pieces instead of toward the enemy.

So also in firing with shot and shell, the time between the command to halt and the first shot was the criterion. The more the stress placed upon making this shot, the less necessarily the value placed upon accurate pointing. Never, until the moment when the rifled pieces were adopted, have I seen a superior or general officer take the accuracy of the practice as a basis upon which to form an estimate of the instruction given the battery, whether good or bad.

The battery was inspected in regard to the correct execution of the battery evolutions and of the cadenced step; as to the manual of the piece; the correct equipment of men and horses; and as to the time required for the battery to open fire, all of which was certainly important. But when, at target practice, the effect produced and the number of hits were less than the percentage established by long experience, great indulgence was shown, and the inspector even went further in saying that in that respect hazard played a great part. It was well known that the piece was defective in this respect, and therefore it was necessary to show indulgence. If then, a captain had by chance many effective shots to his credit, and prided himself upon that fact, he was laughed at by all, and no one believed that either the chief or any of his men were entitled to any particular credit for it.

At the time when the rifled pieces were adopted an officer who demanded that the pointing and the effect of the fire should be made the chief object of instruction read an essay in which, in the clearest terms, he deplored the

fact that the officers in inspecting the target practice manœuvres employed themselves chiefly with the shoeing of the horses, the bridles, the bits and the harness, and considered the firing simply as an occasion for getting rid of the fixed ammunition, which was so inconvenient to transport. His hearers were very indignant, and doubtless those were the most so who felt that the reproach fitted them particularly.

However, it was right, at that time, to attach a greater degree of importance to having the evolutions executed correctly and with elegance, than to making good practice. You remember the paradox of the horse-artilleryman who said: "The artillery would be a delightful corps if it did not have to drag the cannon after it?" He certainly expressed what everybody felt without daring to say. In truth they had forgotten the true warlike aim of artillery, but it was the natural result of the imperfections of our pieces and of the long period of peace.

Finally, I ask you to call to mind the numerous useless evolutions executed on the drill ground, such as the deployment by a flank, the formation of column of platoons upon a designated platoon—a movement executed by a whole battalion, and finally, and above all, the change of front of a battery of four pieces while firing, executed upon a point supposed to be between the second and third pieces, a manœuvre that I used to like myself when I was a lieutenant.

You may, perhaps, object that at least on one of the days of the manœuvres there was firing for a prize and that this exercise, by the fact of its existence, proved that some value really was attached to the importance of accurate practice. But you would not mention this if you had closely examined how matters were conducted in this firing for the prize. It was conducted upon a large target at a carefully measured distance which I believe was 900 metres for the 6-pounder. The number of hits decided the prize. The men of the detachment which won it were so firmly convinced of what they owed to chance, pure and simple, that they did not keep it for themselves. The money value was turned in to the battery and eaten and drunken in common. Such was the tradition. It seems that at that time it had been wholly forgotten that the winners had the right to choose between a prize in money and a commemoration medal.

When I took command of a regiment of artillery and after the adoption of the rifled pieces, I put my hand upon this old regulation and made inquiry as to which of the men had preferred the medal, but I could find no one in the regiment who knew anything about it or could tell me where an application for the medal should be sent.

Let me add one word more upon the "Fire for information and for study." As I have said above this took place at the end of the target practice season. The information and instruction derived from it were, therefore, not put in practice the same year by the battery, and by the following year had been almost wholly forgotten. Often, also, they experimented with what were the personal ideas of such and such a member of the *Commission d'expériences*, ideas which were hardly likely to live. The battery received instruction clearly defined and having the character of regulation only when the idea was to introduce a novelty, as for example, in 1849, the employment

of projectiles with eccentric chamber; then again the oblique fire with 25-pounder smooth-bore howitzers, and later with the short 12-pounder.

It was very rare that instruction was given in firing upon a moving target. There were many difficulties in the way, and the draughts upon the fund for target practice were heavy, and this was further depleted by the great cost of the large targets.

The chief difficulty was caused by the lack of precision of the pieces which rendered a very long cable necessary, and this became very easily entangled in the inequalities of the firing ground, and not only that but the target for the old smooth-bores was so large that it was difficult to move it at all. It was very rare then that the men ever saw such firing as would be required of them in actual warfare; that is, upon a moving target whose distance was unknown.

As for exercising them at it, that was impossible. When by chance they did witness it they drew but one conviction from what they saw which was that the mark could not be hit. That was not calculated to give them a sentiment of assurance against an enemy moving to the attack; this they only had in regard to canister fire. But how would they have fared in face of an enemy's infantry armed with breech-loading rifles, who were beyond effective canister range, but whose bullets had full effect upon the batteries?

It was at that time considered sufficient to give general rules to the men both in regard to practice upon a moving target and the estimation of distances.

In regard to the first point the rule was very laconic, "Advance and open fire upon the head of the column." As to the estimation of distances it was made, it is true, the object of particular instruction, and during the prescribed course the cannoneers were even required to learn by heart the rules of optics which were applicable. But, as every one knows, are not applicable to all men alike, for the eyes of different individuals receive very different impressions in regard to distance. There is, therefore, but one way of obtaining good results, and that is to exercise each man by himself. To exercise them in this way, however, would have required more time than was available, for if it is necessary to begin by pacing off a distance of 1,000 or 2,000 metres, this alone takes a quarter or half an hour.

Besides, one had no occasion on which to reap the benefit of the skill which the men had acquired in this exercise—no note was made of results obtained—consequently the whole matter fell into neglect.

It was the rifled piece whose projectile, bursting at the very moment it touches the ground, gives an instantaneous indication as to whether an error has been committed and whether it has been considerable or not; it was the rifled piece, I say, which gave a practical exercise in the estimation of distances to all the men of the battery with each shot fired, which made it necessary for all the officers to exercise themselves in the estimation of distances; for when they judged erroneously they failed to hit the mark.

In 1860, the artillery received the first rifled field-pieces. They then formed a quarter of the total armament. You will, perhaps, say that between 1860 and 1866 there was plenty of time in which to learn to fire with the new pieces, and, at first sight, all will agree with you. But who was

there to instruct the men when no one had fired them during a war or as they should be fired in actual warfare? Should not the inventor have been the instructor? But this inventor was the artillery *Commission d'expériences*.

Its president, Lieutenant-General Enke, had for six or seven years fully deserved the thanks of our artillery for having, on the one hand encouraged without ceasing, M. Neumann, then colonel, to continue his researches, and on the other hand, for taking up the defense of his invention and obtaining its adoption.

General Enke seemed finally to have set for himself the one single task of the creation of the rifled piece. He occupied himself with it exclusively, and as he lived but for the service of the artillery (It was he who said: "The day has 24 hours, which should be devoted to the Service; besides, one can work at night") he waited for the target practice school of 1860, when the rifled pieces were to be fired for the first time, as a child awaits the Christmas festival and its Christmas gifts. It was not granted him to see this school. Several days before it was to commence he was found dead in his arm chair.

The new invention did not furnish a sufficient cause for wholly modifying the manner of conducting the practice. The man who had been its chief promoter was dead, and that too while yet a great majority—three-fourths—of the field artillery was yet of the ancient model, and the new piece still had numerous opponents who thought it too complicated for actual use in war, and who distrusted it because its execution with canister left much to be desired.

Practice firing continued then to be conducted after the old regulations and nothing could be said about it while the rifled pieces were still in the minority. They were fired upon the principles which had hitherto governed target practice, except that the range was sometimes increased. We were greatly pleased to have them, for each shot told (they fired at the ranges at which the fire of artillery really produces a destructive effect), but they made great inroads into the target practice fund, for they demolished everything.

The artillery was not at this time sufficiently advanced to consider the bursting shell as the best of all telemeters, for usually the shells were fired with only a blowing out charge, and were recovered that they might be used a second time.

In 1864, the number of our rifled pieces was not yet one-half of the whole number.

However superior our rifled siege pieces showed themselves at Düppel, however superior they showed themselves to both the rifles and the smooth-bores of the Danes, we were not the less obliged to recognize the fact that we had not yet derived all the advantages expected from the superiority of these pieces, the reason being that we had not yet learned how to make the best use of them. At the same time it had become more and more evident that it was a matter of the first necessity that the officers should be taught how to fire their pieces so that they should know what orders to give, and should be able to control their gunners and cannoneers, whose duties are

really to be only the aids of the officers. At the same time it had become evident that a man could not learn to fire well, except by actual practice. For this purpose, however, the ammunition which the Minister of War could afford to give for the annual target practice of all the regiments and brigades of the Army was very far from sufficient.

This is why a school of firing was created for the officers, who in the beginning themselves executed the service of the pieces. The zeal of the artillery officers was so great that they willingly defrayed their own expenses at the school, and the Minister of War had only to grant the ammunition necessary for the first period of instruction at the school, which was then considered as an experiment.

Whoever has observed, even but casually, the mechanism of a constitutional State in which the least expense beyond that which has been usual must first be voted upon by the representatives of the country, knows the slowness with which those improvements which necessitate increased expenditure can be introduced. The War Minister, not having the right to demand the necessary funds, is obliged not only to convince himself of the utility of the improvement, but he must further be able to demonstrate it.

It is thus that it happened that the new school of firing had not been able to give results great enough to be generally felt when the war of 1866 broke out, for the Minister of War had not yet been able to increase the amount allowed for ammunition.

Convinced as the artillery was of the importance of a school of this kind, and forced to the conviction that the fire of the new pieces would certainly have been much more efficient in 1866 if the batteries had been better instructed, the artillery worked with all its energy to have the officers' school of firing regularly established.

Their reasoning prevailed, and the school was established.

A singular destiny that, which was reserved for the "scientific" arm of the Service! It saw itself obliged to borrow from the infantry, the arm not "scientific," its essentials—the rifle breech-loading arm, and not that only, but also its method of theoretical instruction.

That under the conditions then existing perfection could not be reached in a day you will comprehend without trouble. It was necessary at first to obtain a certain number of instructors; then for these instructors to establish definite rules according to which the battery should learn to fire, before they could be permitted to deal directly with the troops. The astonishing thing is that success was achieved in such a short time.

The school for officers went through the course twice per year. Two classes per year kept constantly at work whether the sun shined with torrid heat or the winter brought frost and snow. It was the end of the year 1867, when we had at our disposition a sufficient number of instructors to be able to teach all the troops the rational method of firing. At this period, also, very nearly all the old smooth-bores had been replaced by rifled pieces. Then the time had come, as all agreed, to modify the principles according to which the batteries conducted their practice firing.

The inspector general of the arm, therefore, in the first month of the year 1868, invited the officers of the school of firing, and of all the artillery battalions

to send in to him their propositions in respect to this matter. All artillerymen had made these modifications the subject of study and had formulated their ideas and their several ways of viewing the subject. Hence the propositions, according with the different points of view and with the personal experiences of the war of 1866 were so divergent that the inspector general finally left to the generals and the colonels commanding brigades almost entire liberty in regard to the dispositions for the inspections of 1868, at the same time giving them the very liberal sums of money which had been voted for the purpose. The inspector general contented himself with deciding that before there should be any of the regular practice there should be, as a sort of introduction thereto, a *tir d'enseignement* executed by one horse battery, one mounted battery, and one battery of heavy artillery, each commanded by a captain who had followed the course as given at the school of firing, for the purpose of demonstrating to all the officers that method of procedure which had been found to be most practical, after trial, by the school of firing. Thus directed and instructed, the brigades could in 1868 make experiments which would serve as foundations for the propositions they were called upon to make. These propositions, combined with the result of new experiments made by the school of firing, were the foundations upon which were formulated the new articles, which when properly arranged constituted a *Dispositions de Revue* of 1869 and of 1870.

This is all ancient history, and at this present time every young artilleryist would be astonished if told that scarcely twenty years ago the artillery was without any school of firing for its officers.

But whoever has served in the period before the school existed—whoever has followed the developments which have resulted from its creation—must to-day fully realize how great has been this transformation; and if the question which forms the subject of the present letter is to be answered, must necessarily stop some moments at the foundation of this school of firing.

Having thus rapidly sketched the transformation of the artillery, I pray you to study with me a *Disposition de Revue* for the year 1869 or 1870—one which was approved for a year in which all the pieces were rifled—and compare it with one of the years preceding.

You will first observe that the targets represent troops and are much smaller than they formerly were. The infantry and cavalry targets are but fifteen feet wide; the artillery targets represent pieces, men and horses. There are also targets representing skirmishers, some of men standing up and others of men lying down, similar in model to the targets for the infantry. These targets cost more trouble but less money, and it results that the necessary funds for a moving target and for practicing upon it are always available. The brigade that I commanded even found money enough to build a little railroad upon which the target ran to and fro.

The target practice began with a "preparatory course of firing for information and instruction," in which three batteries upon a war footing (one battery of four pounders, one of sixes, and a horse battery) commanded by captains who had followed the course of the school, demonstrated how to conduct the firing under the different conditions shown. All the officers were present as spectators or auditors. The principal subject upon which

instruction was given was the fire upon a moving mark, which either advanced directly upon the battery, marched obliquely toward it, or crossed its front. Abundant ammunition was furnished. Then came the elementary firing with shot (provided there had been none before) where the recruits, who were already accustomed to blank firing, could obtain an idea of the effect of a single shot upon the target. As soon as officers and men were thoroughly grounded in the elements, the "instruction firing," properly so called, commenced. The firing then was never without projectile, but always as in actual war. The locations of the targets were changed daily. Often the batteries were stopped in the midst of their practice upon one target and directed to open upon another. Not only did the batteries fire one by one, but single platoons were sent forward to open fire, and in this way even the youngest lieutenants were given the opportunity to show whether they were able to estimate distances and to conduct their firing in the proper manner. As regards ammunition, the parsimony of the past no longer existed.

Besides the firing executed in presence of the inspector-general, each battery fired 182 shells.

With this quantity each of the 40 to 44 recruits which each battery contained could not, it is true, become a graduate gunner, but it was amply sufficient to enable each battery to find out which of its men were physically unable to become good marksmen. It had been established that it was not necessary to teach them all, for, at the ranges used by the new pieces, the cannoneers did not all have sufficiently clear eyesight to be able to aim the pieces with the necessary accuracy. Therefore, as soon as the recruits reached their regiments they were examined in regard to their vision, and only those who had excellent sight were exercised in pointing. These last were tested a second time, and those who showed the greatest accuracy in pointing were detailed as gunners when shot were fired. It was found that it was only necessary to exercise a dozen of the recruits in each battery in pointing, and these acted as gunners alternately.

All the regulations were then established by which the artillery could learn to fire accurately.

You will be interested in noting that it is in regard to the practice upon a moving target that I give you the most detailed data. Enthusiastic huntsman as you are you know well how difficult it is to hit with ball the game which crosses your path. The difficulty is still greater in the case of the field-piece with which it is not possible, as it is with the rifle, to follow the moving object and to fire when the line of sight and the elevation are what is desired. The gunner does not fire, he must even leave his piece before the command to fire can be given. This necessity of awaiting the command to fire makes a further complication, for each piece must wait till all are ready, so that quite a length of time may elapse between the moment when the piece was pointed and that at which it fires, an interval during which the target is changing its place.

When the firing upon a moving target was still in the experimental stage there was a great difference of opinion amongst the captains as to the manner in which it should be conducted. In the year 1868 I caused

each of them to fire, at the time of the elementary exercises with ball, twenty case shot upon a moving target without promulgating any rules for their guidance, to the end that I might be able to determine by the results which was the best method of procedure. In 1869 and 1870 the rules had been formulated and clearly defined for this exercise.

All then agreed that it was necessary to select some one point toward which the mark was moving and to obtain the range of this point. As soon as the proper elevation was found the firing should cease until the instant when the moving object reached that point when it should be covered with a hail of projectiles. This method was very simple when the mark moved directly toward the battery, that is to say, when the enemy attacks thus; in this case it is only necessary to give an elevation which will cause the shell to strike and burst short, and to note the spot it strikes.

But how will the firing be conducted when the enemy has reached this spot? On this point opinions were very divergent. Some would fire all their pieces by salvo, others open a rapid fire, and still others believed that the best results would be obtained by opening a steady fire by piece successively.

You will perhaps say—and it is what I myself said at the time—that a salvo by battery, directed upon the spot at which the six pieces are sighted, must necessarily be the most rational method of procedure. But, strangely enough, the captains who fired salves were those who made the least number of hits. The men were easily impressed by this simultaneous detonation and became nervous and restless, which was, without doubt, due to the violent noise and the impression it caused upon the organ of hearing. It may be added that the battery felt itself without defense when all its pieces had been fired, and that this feeling made it extremely difficult for it to regulate its fire calmly upon a new point. More than this, the thick cloud produced by the smoke of the powder, which envelops the battery after a salvo, prevents the captain from obtaining a good view of the effect produced. If the trial shot had been badly aimed so that it furnished a false datum, the whole salvo would fail of the mark. Better results were obtained by those who ordered a rapid fire at the moment when the target approached the point fixed upon. In executing this, the officers, after the captain had indicated the wing with which the rapid fire should begin, caused the pieces to fire at intervals much shorter than those hitherto prescribed (one should count slowly from one to fifteen between each shot), but never so rapidly that it was not possible for the officer who supervised the piece which had just fired to be able to supervise also the piece which was about to fire, so that he could always control the manner in which the pieces were served. But the highest percentage of hits was given by the regulation fire commencing on a designated wing, because the pieces were then served with the most calmness, and, above all, were pointed with the greatest accuracy. But the percentage of hits having in each case a fixed relation to the amount of ammunition expended, it was found that these pieces, firing more slowly, expended, of course, less ammunition, and that the rapid fire, for an equal length of time, gave more hits, although it was at the expense of a greater amount of ammunition. The decision reached, as a result of

this experiment, was that ordinarily (that is, against a body of infantry) it will be best to use the slow fire by successive piece, and exceptionally, against an object moving with rapidity (that is to say against cavalry) a rapid fire commencing from a designated wing. The salvo by battery was absolutely thrown out. The batteries under my orders in 1870 and 1871 used it only when at the beginning of an action, it was not possible to follow and observe a single projectile, and that the six explosions were necessary in order to be able to see the effect. We used it then as a telemeter. I shall doubtless have occasion to return to this subject again.

In regard to the fire upon a moving target, we had also formulated definite rules and principles and had established a system according to which we had already exercised the troops when the war broke out in 1870. For this broke out just when we had learned what things were indispensable at the fire of instruction, and at the fire with projectile as in actual warfare, so that we entered the field with our artillery perfectly instructed. This was so in the brigade which I commanded, and I have no doubt it was so also in almost all the other brigades.

I had not imagined that the instruction given in time of peace could, in spite of the excitement felt when actually under fire, have given such excellent results. I was so much the more agreeably surprised when, in an action, I halted behind a captain commanding a battery who, in full view of the troops who were attacking him, gave his commands with a calmness which nothing seemed able to disturb: "Against infantry. Change front to right. Object at 1,900 paces from the right wing. Prepare to fire. Fire once." Then, with his field glasses fixed upon the enemy he awaited the moment when the enemy reached the point where his shot had struck, and then commanded: "Beginning with the right wing. Rapid fire." Then began a hellish tumult, and the advancing enemy was lost to our sight in the cloud of smoke produced by our bursting shells which tore them to pieces. After a moment or two the enemy still advancing appeared on our side of the smoke. He had passed the dangerous space, and still advanced in spite of his enormous losses with a bravery we were obliged to admire. The captain then commanded, "Cease firing. At 1,600 paces. One shot," and when the enemy reached the new point designated by the shot, he commanded: "1,600 paces. Beginning with the right wing. Rapid fire." The effect produced was horrible, crushing—no attack could withstand it.

Consider that in 1868 the school of firing for officers was not sufficiently well established to enable it to elaborate the new regulations concerning the manner of teaching how to fire; consider that these regulations were not formulated until 1869; and tell me if it is not wonderful that, in 1870, the artillery as a whole had learned so well how to fire.

This result could not have been obtained but for the action of the Inspector-General of the arm who designated as instructors at the target practice those of the officers who had followed the course as given at the school of firing. At the present time all the captains commanding batteries have followed the course and all the battalion commanders have followed it twice, so that the field artillery is now in better condition than in 1870. It should and certainly will obtain results still more brilliant.

Imagine my astonishment when, after the last war, I asked one of the general officers of artillery most highly esteemed in a neighboring State if this State had a school of firing and he replied: "What is the use of having such a school? The artillery fires well enough now."

Consider that during these last years the inspector of artillery in his general inspections has judged of the efficiency of the batteries by these two points—the number of hits (for these are only possible when the pieces are correctly served);—and the traversing of long distances in rapid but regulation gaits so as to reach the field at the required moment.

Consider also that for him elegant evolutions come in as a secondary consideration, and that all complicated and artificial movements are by him absolutely condemned.

Consider too, that even the chiefs who do not belong to the arm attached the greatest importance to the time that is used in sighting and in obtaining the range (the supreme chief of the Army has in his criticisms upon the grand manœuvres found fault with the precipitation with which the first shot was fired); and you will have the key to the enigma and will know why we have so quickly learned to fire with effect.

The drill regulations have also been modified. It is a matter of course that the new piece should require new rules. But even the principles of the new regulations were no longer the same. While formerly the greatest importance was attached to the manual and to the cadenced step, which certainly are the expressions of a good state of discipline, these points are neglected in the service of the new piece whenever they interfere with the proper management of the piece and its ammunition, and consequently prove prejudicial to the effect of its fire. But when the beginning was made in modifying the rules a clean sweep was made, and everything was cut out which did not bear directly upon the proper aim of the arm which is to appear upon the field at the opportune moment and then to obtain the most effective result from its fire.

From that day complicated and artificial movements disappeared from the field of manœuvres. Each captain endeavored to obtain horses of sound wind and to train them to traverse long distances at rapid gaits (from 3,800 to 7,500 metres, even upon the field of manœuvres). Reaching the field of action the battery should never fire the first shot precipitately. It should fire only after the most deliberate sighting even if it lose several minutes by so doing.

I am somewhat tempted to think that it would be possible to push still farther the work of simplification of the evolutions of manœuvre; that is, it is possible to attach still greater importance to the correct instruction of the *battery*, and to reduce to a minimum the evolutions executed by larger bodies of artillery under a single command.

For according to my experience in war—and you will grant that as regards artillery it has been sufficiently great—there is necessary for the artillery in the field hardly anything farther than the column in march (column by section), the deployment, and the march in battery front.

When the artillery came upon the field at Koniggratz, Major de Miesitschek caused the second battalion to deploy under fire immediately after crossing

the bridge over the Trotinka, at first to the left by batteries, then ploy into column and finally deploy again to the left. I asked him why he did this which took up so much time, and why he had not preferred to place each battery as it came up in the position it was to occupy. "The battalion," he replied, "is under fire for the first time and that is why I wish to proceed just as I would upon the drill ground. The men will then retain their calmness and not be thinking that something unusual is about to happen." I could not disapprove of his reasons and did not interfere with the movements the gallant fellow made. I shall have occasion to tell you later why I bitterly repented having favored this desire to perform evolutions with artillery battalions.

A second time, at Sedan, the chief of a battalion under my command caused evolutions to be executed by his battalion. It was at the moment when I brought up all the artillery in the immediate neighborhood of Givonne, in order to open a decisive fire upon the Wood of Garenne. The first battalion of mounted artillery was then posted directly in front of the defile through the forest of Villers-Cernay. It obstructed it. It was necessary that the first battalion should move forward to permit the second to pass the defile. We were too near the enemy for me to allow the first battalion to move out of the way by a flank, and it was necessary to move it straight to the front. As soon as it reopened fire the second battalion could be brought to the front. The first battalion having moved forward was now occupying a position which was contiguous on its right to impracticable (precipitous) ground, while on its left there was space for the second battalion. This, then, passed the defile in column of platoons at a trot, changed direction to the left, wheeled into line by batteries to the right, and moved forward into the position where it was to come into action.

This complicated evolution succeeded without our suffering any loss, because the enemy was considerably shaken, so that he fired chiefly to make a noise, aiming, no matter where, and sending the most of his projectiles over our heads.

But these are the only two cases in all the battles, in all the actions, in which I have taken part, in which I have seen battalion evolutions executed. The first time I had occasion, as I said above, to repent of it. (I will have more to say about it.) The second time the same end could have been reached by sending orders directly to the batteries without making battalion evolutions, and, besides, those which were then executed were not performed correctly as a manœuvre evolution.

Finally, I have read a pamphlet from the pen of a cavalry officer to whose merit and character the whole Army does justice, in which he expresses the opinion that the drill regulations should be simplified by indicating in one part—the part to which the greatest importance should be attached—those evolutions which could actually be executed in the field; and in another part, those which can be executed at the manœuvres in peace times. The proposition is not without a spice of irony.

If the drill regulations were so simplified, all battalion evolutions except route marches and marches in line would be placed in the second part. I do not approve of banishing the rest altogether from the book, for the

artillery would then find its manœuvres too monotonous in time of peace, and it is necessary to avoid *ennui* and monotony in every way possible, for they destroy the good humor, and that sort of light-heartedness that officers and men should feel in performing their duties.

Furthermore, the general officers have not the time to inspect each battery separately. They demand that it should be made possible for them to witness evolutions made by larger bodies—by many batteries together.

Military Notes.

CADET LIFE OF GEN. JAMES B. MCPHERSON, CLASS OF 1853.

THE following touching the cadet life of the late Major-General James B. McPherson, has recently been published in the History of the 15th Iowa Volunteers, 1861-1865:

The list of candidates, in the year 1849, for admission to the United States Military Academy, bears the name of James B. McPherson, of Green Creek, Sandusky County, Ohio, Sixth Congressional District. He was nominated by the Hon. R. Dickenson, M. C., and admitted, as a cadet, July 1, 1849, at the age of twenty years and seven months.

The class of candidates numbered eighty-nine. At the examination for admission, and in January and June, 1850, it was reduced to sixty-two members. Forty-four members, of whom twenty-seven* are now living, were graduated in 1853. The first class, *proper*, of 1853, graduated fifty-two.

The first and usual alphabetical arrangement of the class for studies, fixed his class standing number fifty-four; but he advanced rapidly, so that after the first annual examination, in 1850, he stood second. In 1851, 1852 and 1853, he stood first.

In the Corps of Cadets he was promoted as follows, from cadet private:

June 17th, 1850, to cadet corporal;

June 17th, 1851, to cadet sergeant; and

June 16th, 1852, to cadet captain.

In addition, August 24th, 1852, he was appointed sergeant in the department of Cavalry.

For the academical year of 1852 and 1853 he was elected President of the Dialectic Society. In that sphere he gave high evidence of his fitness for the position of one in authority over a civil body. As a member of the Society he is recalled, through his efforts before it, as eminent in the rules and modes of reasoning, and the appreciation of logical principles.

During the four years of his cadet life he stands charged with only nineteen delinquencies. Among them are three for being in bed between 6 and 7 A. M., and one for "asleep on bed 3¼ P. M.," thus indicating that his military instincts and studious habits did not always intervene to prevent him from seeking the forbidden sleep, which was, as the Commandant of Cadets was wont to say, "all very well if 'twas only permitted."

Once his shoes were found "out of place at inspection;" twice his tent walls were "not raised at drill;" once he failed to put the handspike in

* Twenty-four, at this date, August 21st, 1889.

proper place at drill;" and once he was detected with "no coat on at 9 and 9½ P. M."

The great military mistake of his cadet life was in permitting a section of his class to ride in an omnibus to practical engineering drill. For this, August 26th, 1852, he was reported for "gross neglect of duty, as squad marcher, for not marching his section properly." The neglect lost to him his captaincy, and caused reduction to the grade of lieutenant and quartermaster, as promulgated in the following order:

SPECIAL ORDERS No. 150.

EXTRACT.

HEADQUARTERS MILITARY ACADEMY,

WEST POINT, N. Y., September 27, 1852.

The appointments of commissioned officers and corporals, existing in the battalion of cadets, are made null and void from and after reveille to-morrow, at which time the following appointments will take effect:

*	*	*	*	*	*	*
McPherson to be lieutenant and quartermaster.						
*	*	*	*	*	*	*

By order of Colonel Lee: *

(Signed) J. M. JONES,
1st Lieut. 7th Infantry, Act'g Adjt.

The offense, it will be observed, is not recited in the order, and it may be inferred that the Superintendent of the Academy felt that the punishment was, without the recital, sufficiently severe.

That the authorities of the Academy hesitated, as to the reduction, would seem from their permitting a month to intervene between the offense and the promulgation of the punishment.

His classmates will recall the merriment once caused while under recitation in philosophy, when General W. B. Franklin—then Lieutenant Franklin, of the Engineers—asked him: "What is a felly?" McPherson, in response, as was expected, found the true elements of the subject intended to be illustrated; but he went far *around* to find the rim of the wheel. No one more than himself enjoyed the circumlocutional effect.

He was pre-eminent in intellectual energy, unaffected simplicity, honesty of principles and purposes, intuitive penetration; and withal, his large heart was ever open to all the refined and noble sensibilities. Never was he flushed with anger, instead, the crowning virtue of moderation, coupled with patience, was ever the director. The high injunction: "Establish thy reign in truth, in sweetness, and in justice," was ever before his eyes. His merit was measured by greatness of soul.

The present Superintendent of the Academy—Major-General Schofield—his classmate, in a letter to the undersigned, has said of him: "It is not easy to specify notable incidents in the cadet life of such a man as McPherson. His career was one uniform exemplification of his remarkable character. An equally developed and thoroughly balanced mind, regular, industrious,

* Brevet Colonel R. E. Lee, U. S. Engineers, subsequently General of the Confederate Army.

and studious habits; scrupulous neatness and good order in person and surroundings; comparatively mature years, and great manly development made him a model of excellence in all that gives high academical and military standing at the Academy.

"Great as were these mental and physical qualities, they were even excelled by the noble generosity of his nature. I recollect well when Sill,* by a mere accident, lost his record as first in one subject, leaving McPherson head in that as in most all others; the latter expressed his regret with the most evident sincerity, said that it was not right, but that Sill deserved to be first in that branch of study. So, in general, McPherson never failed to concede to his class competitors the most generous recognition of excellence, nor to aid his classmates with even extravagant liberality in their efforts to master difficult subjects, and in perfecting their practical problems.

"In McPherson's splendid military record as a cadet officer, the one only incident deemed worthy of censure, which lost to him his captaincy, was but an act of kind-hearted generosity to his class.

"In recalling events of our cadet life and of subsequent years, it is difficult to find language by which to adequately describe the character of the noblest man of our time.

"*'Deo adjuvante, non timendum,'* was the motto of McPherson. He recognized that man, the work of the Infinite Being, is finite, and cannot look on himself without acknowledging it, so finite, so circumscribed, that he hardly knows whether he exists or not."

A distinguished writer, in connection with civilization, has given the following classification:

"The little minds which do not carry their views beyond a limited horizon; bad hearts, which nourish only hatred and delight only in exciting rancor, and in calling forth the evil passions; the fanatics of a mechanical civilization, who see no other agent than steam, no other power than gold and silver, no other object than production, no other end than pleasure. * * * For them (all these men) the moral development of individuals and society is of little importance; they do not even perceive what passes under their eyes; for them history is mute, experience barren and the future a mere nothing.

"There is a great number of men who believe that their minds are nobler than metal, more powerful than steam, and too grand and too sublime to be satisfied with momentary pleasure.

"Man, in their eyes, is not a being who lives by chance, given up to the current of time and mercy of circumstances; who is not called upon to think of the destinies which attend him, or to prepare for them by making a worthy use of the moral and intellectual qualifications wherewith the Author of Nature has favored him."

McPherson rapidly placed himself as found by others, in the latter class—the number who believe that society cannot continue its career without the aid and influence of moral means; and with that fact as an indestructible base, coupled with a constant endeavor to observe the Divine law for the practice

* Brigadier General J. W. Sill, U. S. Volunteers, who was killed December 31st, 1862, at the battle of Stone River, Tenn.

of the precept of charity towards God and towards his neighbor, his youthful cadet life foreshadowed that his works and deeds would be "a numberless offspring born to die no more."

THOMAS M. VINCENT.

August, 1876.

Assistant Adjutant-General U. S. Army.

SMOKELESS POWDER.

I.

Captain Paul Roemer, 5th Artillery, sends us the following from Germany, August 21, 1889:

Traveling through Germany one sees soldiers everywhere, not idle, but busy, from early morning until late in the afternoon, setting-up drill, gymnastic exercises, jumping ditches, climbing walls, squad, company, skirmish and battalion drills, constant practice in fire discipline, target practice, practice marches, etc. In the manual of arms the number of movements has been reduced to a minimum. For instance: From a slope, the habitual position of the piece, to present—to order—to ready, etc., and back to slope. All officers are saluted with, "Present arms."

It is a pleasure to watch the men at their drill. Everything is done with a snap and vim that is surprising. Yet not so surprising, after all, when we take into consideration that companies turn out 150 strong, and with such a fine command, why should not officers and non-commissioned officers go at it with a will? Don't we know from our own experience what a pleasure it is to us when we are able to turn out five sets of fours for dress parade or drill (the average is hardly ever more than four sets)? How often have I heard the question asked at a three company post: "Can we turn out enough men this afternoon for battalion drill?" Is it not a relief and a pleasure to a light battery commander when he looks over his morning report and finds that he is able to scrape together five cannoneers per gun for battery drill?

One hears and reads considerable about the use of smokeless powder. The Guard Field Artillery have used it this year at target practice with highly satisfactory results.

The other day a sham battle on a small scale took place near Spandau before the two Emperors (Germany and Austria), the enemy using smokeless, the other troops the old powder. The appearance of the battle-field was a strange one. The troops advancing against the enemy's position presented the usual battle picture, surrounded by noise and thick powder smoke; while the enemy's skirmishers were lying down, apparently doing nothing. It looked exactly as if they did not answer the fire of the advancing troops, and yet they were busily engaged putting in salvo after salvo as the troops approached.

The effect was indeed surprising. At a distance of four hundred yards no smoke could be seen, no noise could be heard. Coming closer, one could see at the time of explosion just the least cloud of smoke, which disappeared almost instantly, and the noise resembled very much the explosion of a friction primer, only about half as loud, short and quick. With ball cartridges, I have no doubt the explosion must be louder.

I read the other day an article in the *Militar Zeitung* about smokeless powder. It says: "What influence will its introduction have upon the discipline of troops? How difficult will become the examination of the enemy's territory, of his strength, his position. The advancing column, skirmishers and pickets will have a difficult task to perform. No noise, no smoke will betray the enemy's whereabouts; reconnaissances will become almost gloomy, dismal, depressing. Surprises, ambushes, or attempts at such, will be more frequent, therefore more attention, greater watchfulness than ever must be required of pickets and videttes. With the use of smokeless powder we are deprived of our old target. Fire discipline must be practiced more than ever." "The most important change, however," says the *Militar Zeitung*, "lies in the terrible clearness with which every man can see the surroundings, the scenes of slaughter and suffering. Now, a soldier firing from behind a bank of smoke thinks himself comparatively safe, paying little attention to his surroundings, but watching carefully the enemy, when an occasional pause in the din of battle or a fresh wave of wind will give him an opportunity to do so. The noise kindly drowns the cries of the wounded, conceals the moment when the voice of the old, well-tried commanders can no longer be heard. The thick smoke screens the terribly cut up bodies of the dead and wounded, their last convulsions, their painful death. How will a skirmish line look in the future? Every hit of the enemy can be seen, the cries of the wounded can be heard. The changes, the wavering, the depression produced in the command, on account of killed and wounded, will influence the soldier very much. This must be met with the greatest coolness. Every soldier must know and perform his duty. Only then can the smokeless powder be of advantage to an army. An able general with good troops can quickly make his arrangements. The German Army can well afford to attempt the use of this new powder. If every European Army can do so remains to be seen. One thing is certain, the great improvement in everything that relates to war will reduce the number of battles. In future the loss of a great battle will equal the destruction of an army.

II.

FROM LA BELGIQUE MILITAIRE.

(Translated by 1st Lieut. J. C. Bush, 5th Artillery.)

Have you heard of that marvellous powder whose deflagration produces only a feeble report and light bluish vapor imperceptible at any great distance?

In serious military circles no one wished to believe the existence of this diabolical product; to-day however, we must submit to evidence.

In France, the Lebel cartridge contains it. In Belgium, the royal powder mills at Wetteren have succeeded in producing a paper powder having the same properties. Soon, without doubt, the chemists will discover another.

A little thinking quickly convinces one that this new progress in military technology will necessarily occasion many important changes in the Art of War—a revolution in the domain of tactics.

What will be the nature of a battle under the new conditions? Let us endeavor to outline it.

An army corps engaged in a march to the front is enveloped ten kilometres away, by a swarm of cavalry scouts united in groups or patrols. These explore the ground on a front of about nine kilometres. They are supported by reserve platoons who follow them at two or three kilometres. Three or four kilometres further in rear march the main body of the cavalry of exploration. Contact with the enemy once established the scouts are received at great distance by isolated shots or even salvoes.

With ordinary powder it is easy to see from whence come the discharges by reason of the noise and smoke. To burst at full speed on these luckless riflemen or gain the nearest cover while awaiting reinforcements if the engaging force be too unequal, is what our scouts would do under such circumstances. The new powder changes all this.

Sharpshooters in ambush a thousand paces off can send forth, 15 a minute, if necessary, tiny projectiles of glittering surface, with a velocity of 700 metres (2,296 feet), making 2,000 revolutions per second, which pierce the body like wasp stings and go out by a gaping hole, a veritable funnel, in which flesh and fibre are wrenched with extreme violence. Nearly always it means a terrible death. What can the scouts effect against these invisible shots?

If they stop to search the horizon they expose themselves to new discharges more dangerous, better supported. To gain cover precipitately in order to spy out the enemy under better conditions while awaiting reinforcements is the only proper determination. But from what direction ought they to cover themselves or observe?

In any case this position must place cavalry at a disadvantage, for their most effective action is surprise, and this again requires two conditions—boldness and celerity. What must be done to overcome these new causes of inferiority? Medieval cavalry, all cased in iron, with a value measured by the product of mass by velocity, cannot be thought of.

The new projectiles have a penetrative force, such that at 2,000 metres they go through a file of five men. If the properties of the new powder are confirmed in a marked degree we will soon see the dispositions for advance modified. The advance cavalry scouts must group together by entire detachments, and not by twos or threes with an average interval of 1,000 metres. Scouting duty on the march becomes much more difficult, and it will be necessary to attend in an especial manner to the instruction and education of the cavalryman in this branch of service. The divisional cavalry will have to be augmented, especially on the offensive, and it may become necessary to compose it of men provided with an excellent rifle and knowing how to use it. A mounted infantry, in fact similar to that employed by the French in Mexico, and which the English have just instituted.

Let us now suppose our corps stationary. The troops can attend to their ordinary occupations and even give themselves repose because they are surrounded by a system of advance posts in five echelons, patrol posts not counted. The most advanced of these, the line of double sentinels, is pushed forward 5,000 metres from the principal body. If the enemy endeavors to pierce this curtain at any point alarm shots betray his attempt.

If he pushes the enterprise further the pickets and grand guards, from the advance posts successively intervening, resist it and the isolated detonations rise *crescendo* until they develop an imposing harmony in which, according to the beautiful expression of Captain De Hausch, the rifles play the *altos* and the cannon the *counter base*. The main body has plenty of time to make good dispositions if it recognize the reality of the danger.

With the new powder, more alarm shots in consequence of more frequent surprises of the sentinels, will render greater precautionary measures necessary. The dispositions for security will have to be altered, and the various echelons made denser, placed nearer together or multiplied, for the reason that they should be far enough removed to answer their purpose.

We must increase the artificial means of communication between the advanced detachments and the main body, conventional signals, telegraph, telephone, velocipedes, etc.

The instruction and education of all troops in the special service in question should be pushed to a degree of perfection unknown to-day.

Still more marked changes will occur during battle. The strategical rule of marching to the sound of the cannon so much in request among military authors and so often unheeded can hardly find place under the new conditions. How can we determine, how discover from afar, the points of juncture of the enemy's line, who constitute important points of it and where the batteries are accumulated. The fire of infantry as well as artillery is much facilitated by noise and smoke. These two factors serve often as a basis for determining distance. What will happen when these factors disappear from the field of battle? The greater number of telemetres will have to be thrown away. And the cavalry, how can they charge suddenly? How can the artillery utilize their trial shots for determining distances? It will be necessary to give them two kinds of ammunition, and this will entail complications.

The roar of the cannon can no longer stifle the shrieks of the dying nor smoke hide the contortions of the wounded. Upon the whole the new powder will prove advantageous to the defensive, unfavorable for the offensive, will paralyze the cavalry in battle, properly speaking, and require great improvements in the instruction and education of the soldier. Once more we are removed from the probable reduction in the term of active service imposed on the volunteers.

The reader will readily perceive that we have charged the pallet and filled in the shadows of the picture. We acquiesce, but believe it for the best to bring forth clearly the consequences which the adoption of a powder emitting little or no smoke, or noise, must produce. Let us reassure ourselves, however. We have not reached that point yet. Good authors in serious military reviews claim that such a powder must always remain a myth. A near future will clear up the question.

Germany.—From information in the *Deutsche Heeres-Zeitung* it appears that the Noble Dynamite Company has negotiated with the German Government for the delivery of quite a considerable quantity of smokeless powder.

At a meeting held lately at Hamburg the directors of the companies

which form the association called together to decide in what mills the manufacture of the new powder should be undertaken have designated Hamburg, Opladen and Dresden. We are permitted to conclude from this, if the information be correct, that the smokeless powder of the Germans has a near relationship to dynamite.

Switzerland :—We extract from the report addressed to the Federal Assembly, on the subject of the adoption of a repeating arm of small calibre, the following passage relating to smokeless powder :

"The advantages and inconveniences of smokeless powder can only be determined by a future war. Notwithstanding the uncertainty which still exists on this subject, no State can, however, resist the tendency towards its adoption. None of them have been able before this to resist the introduction of a repeating arm, though this innovation had caused standing armies to smile, in which to-day they appropriate millions on millions for the introduction of the magazine rifle.

Black powder has held its own for many centuries. To-day the new powder has already been adopted in one State, and is about to be in one other, at least it is studied there with the greatest care.

Smokeless powder favors fire. There are no interruptions as with black powder. It enables one better to observe effects of fire, especially in the artillery. It prevents the enemy from estimating distances, while a line of fire by its smoke is exposed to the blows of the artillery in particular. Subdivisions of infantry, favored by the ground, can approach an enemy's position in future without stopping fire or unmasking the positions which they themselves occupy.

This powder presents an advantage which will not be disregarded where cavalry is concerned ; it prevents in a high degree the surprises of this arm. It is not necessary to insist on the importance of such an advantage. To our own Army all these advantages have, without doubt, their inconveniences also. The movements of the troops of the second line can no longer escape so easily the sight of the enemy. Commanders can no longer indulge in turning movements or other operations that might be undertaken when masked by a veil of smoke. In fact, the struggle, with all its incidents, will be unrolled to the eyes of each combatant.

Whatever be the advantages or disadvantages which, as we have already remarked, can only be clearly fixed in a future war, it remains not the less certain that if the magazine rifle still continues a moral question, so does also smokeless powder.

Should an army be put into the field without this means of combat it must feel itself morally inferior to one which it knows has possession of the new force.

The introduction of the smokeless powder becomes consequently an imperative necessity.

Under the title : *Non-detonating powder and other chimeras*, the famous small-arms constructor Hebler has published the following in the *New Zurich Gazette*, No. 244 : Number 215 of the *Bund Journal*, August 6th, 1889, contains an article entitled "*The new Belgian repeating rifle*," in which I find some entirely inaccurate ideas. I take the liberty of correcting these

errors because latterly they have been spread abroad in a somewhat disquieting fashion. Having assisted in person at the Belgian experiments I am in a perfectly proper position for giving some elucidation of the results.

In the first place the *Bund* declares that the arms presented for competition were of uniform calibre 8 mm. (314 in.) The Mauser rifle had a calibre of 7.6 mm. and the Schulhoff, 7.5 mm.

The same journal states also that all the cartridges submitted were charged with the Belgian paper powder of Wetteren, that this new product behaved well, and that a charge of 2.9 grammes had impressed upon the projectile an initial velocity of 600 metres, corresponding to a maximum gas pressure of 1,800 atmospheres.

Let us correct this information: 2.9 grammes of Wetteren paper powder gave the projectile of the Nagant rifle calibre 8 mm., weight 14 grammes, a measured initial velocity of 574 metres and a gas pressure of 3,410 atmospheres. The other rifles experimented with, gave analogous results. We see by this statement how much confidence can be placed in the ideas of the *Bund*.

As I have already demonstrated in a previous article on smokeless powder, the Wetteren paper powder is without utility because it produces too great gas pressure, quite enough smoke and leaves on combustion a very hard and copious residue.

All the gazettes, with an unequalled levity, have spread abroad errors on the subject of the new infantry armament as regrettable as those of the *Bund*. This is particularly so in all that concerns the Männlicher rifle. They have often endeavored to represent this complicated and defective repeater as one of the best existing arms, and to make people believe that it has been already adopted in several States. Notwithstanding these manœuvres it is well known that but one State has decided for the Männlicher rifle.

The Austrians, who unfortunately possess several thousand of them, can do nothing better or wiser than to change the armament of their infantry radically and anew. They have been recently obliged to reject as old iron about 220,000 rifles of this system, calibre 11 mm.*

If they commence immediately to manufacture Schuloff rifles calibre 7.5 mm. the financial loss which they have suffered in this regard will be reduced to zero because the Schuloff will yield a much better price than the Männlicher. But before they arrive at a favorable decision on this point they should terminate the construction of the new armament. I will now take the liberty of making some remarks on the subject of non-detonating and non-recoil powder. Having had occasion during the past eight or ten months to become acquainted and to experiment with such of these powders as have the best reputation, notably, the one called d'Arigliana of Turin, I can speak with some positive knowledge. A non-detonating powder as well as one without recoil is a chimera. The laws of mechanics are opposed to their discovery. We know that the force of detonation bears a direct relation to the volume and tension of gas at the instant when the projectile leaves the muzzle.

* Was it on account of the calibre or system of rifles?—ED.

The length of this volume is that of the cartridge plus that of the bore. For my own part I am convinced that an air-gun would produce quite as much noise as any ordinary arm at the departure of the shot, if it was subjected to the same conditions.

The legend of a non-detonating powder can be easily attributable to experiments performed with blank cartridges. These produce a scarcely perceptible noise at some hundreds of metres. What seems most surprising is that an absurdity, such as this pretended powder, should be so generally accepted without the least examination and spread abroad in the world with so much rapidity. Poetry has so possessed itself of this fable that men who must otherwise be classed among competent judges in such matters believe in its existence.

Several foreign officers have applied to me to know on what to rely regarding the possibility of manufacturing a powder without detonation or recoil. I have naturally replied in the manner indicated above.

These explanations will contribute, I hope, to throw some light on this question of the hour. In the general interest I venture to express the hope that the article honored by the *New Zurich Gazette* will be found sufficiently interesting, and thus aid in preventing the diffusion of the errors maintained in that article.*

III.

GERMAN PRISMATIC POWDERS, C. 86.

(From the Naval Intelligence Bureau.)

Krupp's report No. 73, October, 1888, gives the results obtained with the new powder submitted for trial by the United Rhenish Westphalian Powder Company. The following is an abstract of a notice of this report published in the *Deutsche Heeres-Zeitung* of February 9th, 1889.

After long experiment the United Rhenish Westphalian Powder Company has succeeded in submitting a new powder, which not only does more work with less pressure than the old powders, but also possesses the property sought after for so many years—the production of but little smoke.

There are two varieties of the new powder, viz., (1) the coarse-grained cannon powder, G. G. P. C/86, for use with small calibres (4 to 8.7 cm.); (2) the prismatic powder, P. P. C/86, employed with medium calibres (10.5 to 25 cm.).

The first resembles in form, size of grain, and color, the coarse-grained powder formerly employed with field-pieces; it has, however, a different composition, which gives it the following advantages: (1) more work per given weight of charge; (2) relatively small recoil; (3) a less quantity of smoke, which is, moreover, rapidly dissipated; (4) less flame at the muzzle of the gun. On the other hand, the new powder has the disadvantage of absorbing moisture more readily than the old, for which reason it must be packed in metal cases.

* It appears from the official report from the Belgian small arms manufactory that this powder with a charge of 2.8 grammes and 14 grammes of projectile gives on an average a velocity of 615 metres at 25 metres distance.

We can affirm that in the same gun a charge of paper powder giving a velocity of 600 metres produced less sensible recoil and noise than one of black powder giving only a velocity of about 450 metres.

The residue is insignificant.

HENGST POWDER.

Under this name has appeared a new explosive, of which the following account is drawn from *Engineering* :

The new powder is prepared from straw, which is pulverized, chemically treated, and prepared in granular form for use. It is claimed for it that it is smokeless, flameless, practically non-fouling and non-heating, and that both the recoil and the report are less than those of black powder. The powder has recently been tested by Mr. P. F. Nursey, C. E., the experiments being made comparative with ordinary gunpowder. The firing was from an English pattern Martini-Henry rifle, the charge in one case being 85 grains of rifle fine-grain powder, and in the other 35 grains of Hengst powder, the cartridges in other respects being alike. The results showed the velocities due to the Hengst powder to be somewhat lower than those due to its competitor, but in this respect a grain or two more of the Hengst explosive would doubtless have placed the two on a level.

MAXIM POWDER.

The London *Times* of March 23d, contains a notice of a then recent competitive trial between ordinary black powder and the Maxim smokeless powder.

The firing, it is judged from the context, was from a Maxim automatic machine gun, .45 bore. The charge of black powder was 85 grains to the cartridge, while that of the Maxim powder was only 55 grains; yet, with the latter, a slightly increased velocity was obtained. The noticeable point, however, was the comparatively small amount of smoke produced by the Maxim powder. After some thirty rounds with the black powder it was impossible to see the target, while with its competitor the target was clearly discernible throughout a series of fifty rounds, the powder causing only a faint mist. The atmosphere was clear, and there was a light air. It is said that at a distance of 600 yards it would be almost impossible to fix the position of the firing line from the smoke indications, and at that distance also the report would be scarcely audible.

Another advantage claimed for this powder is that, if wetted, it regains its efficiency after drying.

LEBEL POWDER.

The *Rivista di Artiglieria e Genio*, quoting from the *Revista Cientifico-Militar*, says: It is now known that the Lebel powder is a nitrous compound similar to pyroxilin, and that it deteriorates so rapidly that the marvellous results claimed for it can be obtained only with cartridges newly made—with powder only a few months old the initial velocity falls off notably. In consequence of this the French have abandoned it in favor of an ordinary black powder.

The report adds that under these circumstances the Lebel rifle will be in nowise superior to the Austrian Mannlicher or the Portuguese Kropatschek; it will be simply a good 8 mm. small arm, capable of firing a ball of 230 to 280 grains weight with a velocity of about 1,800 foot-seconds.

OTHER SMALL-ARM POWDERS.

According to the Belgian journals the Royal gunpowder factory at

Wetteren, Belgium, has succeeded in producing a variety of powder equal in all respects to the Lebel powder. This new product has received the name of paper powder, and is said to be remarkable for a complete absence of fouling.

It is stated that the Belgian Government has accepted the Wetteren paper powder for new magazines rifles, and that an initial velocity of 2,378 foot-seconds has been obtained with it. It is, however, believed desirable to reduce this velocity to 1,968 foot-seconds, in order to reduce the work upon the piece. The charge necessary to produce this velocity is but 45 grains with a bullet of 216 grains; the corresponding pressure is about 7 or 8 tons to the square inch. The powder is said to possess great stability, to be smokeless, to give high velocity, and to be not injurious to the bore.

The Italian Government also claims to have produced a successful rival of the Lebel explosive.

The *Militär-Zeitung* states that the German Minister of War has concluded contracts with Rottweil-Hamburg and the United Rhenish-Westphalia Powder Companies for the delivery within a short time of a smokeless powder for the new small-bore rifle.

About the beginning of the year, experiments were made in France with a new powder, which, when fired from the Gras rifle, gave a velocity of 1,900 foot-seconds, as compared with 1,475 foot-seconds due to the old powder, the charge in the former case being only 60 per cent. of that in the latter. The new powder is said to be smokeless and not to be affected by damp.

It is reported by the *Army and Navy Gazette*, May 25th, that Captain Noble, of the Elswick firm, has produced a new powder which seems reliable and is practically smokeless and noiseless on explosion. It is to be tried by the War Office at Lydd, and will probably be adopted for small-arms and, in a modified form, for R. F. guns. It is said to be of a "curious, grayish material in long threads, or whip-cord, like form, presumably from the shape it assumes under hydraulic pressure." At 300 yards distance it is not heard, and but a faint haze is seen when a volley is fired.

J. C. B.

CAVALRY ARMAMENT.

I.

(Translated from the "*Revue du Cercle Militaire*," by 1st Lieut. J. C. Bush, 5th Artillery.)

A recent decision rendered in France gives the lance to ten regiments of dragoons, but only for the front rank. The measure appears excellent, provided the troops of the line are to fight in closed order.*

* This is no new idea. Marmont, in his *Esprit des Institutions Militaires*, says: "The cavalry of the line should have lances and straight swords; the front rank to charge with the lance, the second rank with the sabre—once the shock has taken effect and the ranks become mixed the swords of the second rank will perform their office."

The Russians have the same arrangement, maintaining that after the first contact of two bodies of cavalry charging, the lance, even for the front rank, becomes almost useless, and still more so for the rear rank, so that the rear rank must have swords with which they can back up their front rank men. The principle is the lance for the shock and the sabre for the *mêlée*. (J. C. B.)

In the charge made by the lancers of the guard at the battle of Gravelotte (16th August, 1870), against a regiment of Prussian cavalry armed with the sabre, the first rank of the Prussians was completely dismounted by lance thrusts.

This does not apply to light cavalry, though in nearly all European armies they have felt obliged to supply it to them also.

All light cavalry ought to be armed with a view to single combat. Now there is no weapon so ill-suited to this kind of fighting as the lance. It is difficult to manage and leaves the horseman entirely without defense after having delivered a thrust easy to parry with a short weapon. Then also light cavalry often requires to be concealed to pass unperceived. No arm betrays its presence so quickly as the lance, for to meet requirements it should be about three metres and a half long. Hence there appears, about two metres above the heads of the troops, a brilliant line of lance points strongly accentuated by the showy colors of the pennant.*

Finally, the lance weighs considerably, is inconvenient to carry and takes away, consequently, part of that agility which we believe one of the first qualities of the light cavalryman. In our judgment, therefore, arming light cavalry with the lance is a mistake.

As to the reason for this error, which since the last war, with its legendary Uhlan, has become almost a precedent everywhere else than in France, it seems to be this :

When the Russians were forced to defend and afterwards to reconquer their independence from the Moguls, they employed the Cossacks of the Don and Zaporojie. During this struggle the Cossacks represented the regular and organized element against the irregular Mogul cavalry. Not only were the former armed with the lance, but their manner of attack corresponded to the employment of this weapon. Then, as now, they attacked in closed line, the only peculiarity of which consisted in causing the horses of the second rank to enter between those of the first in order to extend the front and envelope the enemy on one or both of the wings.

In the conflict between Russia and Poland, which followed the expulsion of the Moguls, we see these Cossacks by turns on one side or the other. At times one party among them aided the Russians while the other fought in the ranks of the Poles.

Gradually the Russians and Poles adopted the lance also. We insist here on this point that during the adoption of the lance among these two peoples, their cavalry were, relatively, a cavalry of the line with whom the lance was in its proper place. Only later, when first the Poles, and afterwards the Russians, were occupied with the cavalry of the West, with its armament and organization of the middle ages, the Polish and Cossack lancers became again, relatively, light cavalry. They still preserved the lance as a traditional weapon.

Little by little Europe imitated them by giving this arm to her light cavalry also. She did more, she caused it to disappear from her heavy cavalry of the line. Russia alone, fifteen years ago, introduced it there anew.

* Colonel Brix of the German staff, in his *Thoughts on Organization, Training and Employment of Cavalry in Modern Warfare*, remarks : "The long lance of 9 or 10 feet is unsuitable for the mêlée. Perhaps the best length for a lance would be two metres, which should be held as near the butt as possible, so as to make it as long in reach as the ordinary lance held in the ordinary manner. In the mêlée or in single combat it would be held in the middle; it would then become a description of lance no longer than a sword, and as easily wielded, and with its longer reach would be more effective. He thought that besides this lance the cavalryman should have a light sword. (*R. U. S. I. Journal.*)

If another proof of the small utility of the lance for light cavalry is desired, we have but to glance at the Oriental people who have unrivaled light cavalry, the Kurds, the Arabs, that ancient famous Turkish cavalry. They always preferred the short "white weapon" to it. As to the blade, there seem to be two kinds which combine requisite conditions, the curved Eastern sabre and the straight sword with a single edge. The curved sabre is a formidable weapon in the hands of those knowing how to use it, but much skill is necessary. We believe it impossible for the majority of cavalymen to attain the necessary dexterity in the few years which they now pass with the colors in European armies.

Here, therefore, we are in favor of the sword. But, in exceptional cases, where a country has at its disposal people accustomed to the true sabre, with its broad blade, keen and sharp as a razor, it would be decidedly wrong to substitute any other weapon whatever. As to the more or less straight sabre, common in European cavalry, we do not hesitate to condemn it absolutely. It avails neither to point, because the slightly curved form causes the thrust to glance, nor to cut. With a thick blade, sharpened under an angle of from 45° to 60° , it gives but blunt cuts and can only sustain rivalry with the club, while the latter is more solid.

We saw a Spanish officer in the Morocco expedition walking around after having received about thirty sabre cuts three weeks before. He had not lost a single member.

Whatever the "white weapon" adopted, the scabbard should be lined with wood in order not to dull the blade. We could wish also an essential change in the manner of carrying it.

If the cavalryman loses his horse in the fight the blade suspended from the sword belt inconveniences his movements and is of little use against a cavalryman on horseback as against a foot soldier with a bayonet.

The only weapon which then can have any real value is the revolver. Instead of attaching the sabre to the belt it could be suspended from the pommel of the saddle with the end passed through the left stirrup leather after the manner of the Mexican rancheros. This method is likewise more convenient for the horse. In rapid paces the sabre often strikes the rider's elbow very painfully, excites young horses, and above all causes a rattling which requires special precautions on each secret expedition, especially as the authorities persist in retaining the metal scabbard, which from all accounts, accords but little with practical experience.*

Whatever the white weapon given the cavalryman there will be times when he needs a fire-arm. To shoot from horseback, with any kind of arm requiring two hands, supposes a wooden horse or that no other effect is desired than noise and smoke. This does not apply to the revolver, which the cavalryman can use with one hand and which can render him the greatest service, whether for giving a signal or for defending himself when his blade has been broken; finally it enables him on being pursued, to disembarass himself of an enemy who presses too closely, without losing time to turn his horse; or when pursuing, to attack at short distance, an enemy he cannot

* Why not scabbards of papier maché?

entirely overtake, owing to accidents of ground or fleetness of horse. In our judgment the revolver suffices for scouting service as well. For when a reconnaissance is in question where it becomes necessary to carry by main force a position defended by infantry it will rarely be wise to send cavalry alone even though provided with a repeating rifle. As the revolver is the only weapon on which the cavalryman can rely when his horse is killed under him; it should be carried on the belt and not in a holster, from whence it is often difficult to draw it in time.

"We naturally ask what were the circumstances which led to the disappearance of the lance in the French Army? It appears that after the War of 1870-71, when it became necessary to reorganize the military forces, the first step taken relative to cavalry was to abolish the lance; and by a ministerial decision in August, 1871, nine regiments of lancers were dispersed, and incorporated into other branches of cavalry, hussars, chasseurs, dragoons. The principal cause of the abolition of lances is to be attributed to certain not very well-reasoned ideas springing from the moral depression caused by the disasters of 1870-71.

"In the state of mind thus induced, the French seem to have exaggerated the effect of modern arms of precision on the rôle of cavalry, and to have overlooked the fact that its shortcomings in the late campaign were greatly, if not chiefly, due to want of skill in the higher ranks, to a certain unreadiness for war, which pervaded the whole army, and to a too faithful adherence to antiquated regulations and formations. Even before the war was over, distrust in the lance, and in the *arme blanche* generally, had become pretty widespread. A French colonel of lancers is reported to have requested the Ministry to take away his lances, and to give him chasse-pôts instead, adding that, armed as he was, he could not efficiently reconnoitre and "enlighten" (*eclairer*) the Army. But the authorities, in reply, pointed to the Prussian Uhlans as an example of men armed in the same manner and having become specially notable for reconnaissance services, and it is a very curious instance of the inconsequence of public opinion that, just at the time when the French lances were being abolished, the renown of the legendary Prussian Uhlan had become exaggerated almost to the point of mythology."*

II.

In Germany the necessity of giving to the cavalry the support of a fire-arm being considered undeniable, they have only to choose between two means, viz.: (1) association with cavalry, bodies of infantry, mounted or conveyed on wheels; and (2) providing the cavalry with fire-arms. They have chosen without hesitation the latter method; hence abolition of the cuirassiers. They also find it advisable to provide that half of the cavalry which is the heaviest and most powerful in the shock, with the lance, the tactical arm *par excellence*.

Germany then will soon possess only two descriptions of cavalry, viz., cavalry of the line, powerfully mounted, and armed for the charge in line,

* Col. Z. Elias, in *Royal U. S. I. Journal*, No. 149.

i. e., the cuirassiers and uhlans; and the light cavalry, more alert for fighting on foot and better equipped for individual combat, *i. e.*, the dragoons and hussars. Carbineers, light horse, etc., as far as concerns organization, will be no more than historical varieties of the above two categories.

There is nothing new in the application of similar ideas to cavalry organization; their origin is to be found in the wars of Napoleon.

In a letter to General Clarke, Minister of War (12th August, 1811), Napoleon writes as follows on this double question of cuirassiers and lancers: "It is admitted that cavalry in cuirasses cannot easily use a carbine; but it is nevertheless very absurd for three or four thousand brave men to be surprised in their cantonments or stopped on their march by a couple of companies of light infantry. * * * I desire that you form a council of cavalry officers, and come to some conclusion on the subject. I cannot accustom myself to see 3,000 picked troops made prisoners, perhaps, by the light troops of some partisan leader in an insurrection or a surprise; or, on a march, pulled up by a few wretched pot-shots behind a stream or a house; this is absurd; my intention is to give every man a fire-arm.

"War is made up of unexpected events; and he has no notion of it who supposes that 15,000 heavy cavalymen can always make sure of some escort or cover.

"As to the lancers, see if it is possible to give them a carbine in addition to the lance.

"* * * The Cossacks have lances, but they have carbines, and even long muskets, with which they shoot at long ranges."

That is the programme now being partly carried out by the Germans in their cavalry reorganization.

Colonel Denison gives his opinion that heavy cavalry should be armed with lance, sabre and revolver; one-half of them, or a somewhat similar proportion, being armed with sabres and revolvers alone, and the remainder with lances in addition. He also calls attention to that phase of the Franco-German War when, early in the siege of Paris, the French had organized the "Francs-tireurs." "When these Francs-tireurs became numerous, the uhlans could no longer move freely to great distances, but were almost always accompanied by battalions of infantry. * * * The experience of the Franco-German War is very remarkable on this point, for the brilliant exploits of the Prussian cavalry in the beginning of the campaign would lead one to expect that they would not have been much embarrassed by the opposition of such undisciplined and irregular troops." This it will be noticed, is exactly what Napoleon I. wrote about in his letter to General Clarke, quoted above.

The *Progrès Militaire* speaks unfavorably of the introduction of the lance into the French cavalry, and the *Deutsche Heeres-Zeitung* seems to endorse its views. The ten dragoon regiments of the six independent cavalry divisions are to receive this weapon for the front rank. This arrangement, observes our contemporary, will render it necessary for the cavalryman to be instructed in no less than four weapons—sabre, carbine, lance and revolver, and it is evident that the short-service system allows no time for this. Is the lance such a formidable weapon after all, it is asked, or is

General de Gallifet merely following suit to the Germans in adopting it? It is a recognized principle in modern warfare that cavalry stand no chance against infantry in organized masses; the lance, therefore, can offer no advantage in attacking squares or columns, while it is urged that, as regards cavalry against cavalry, a lancer regiment at Rézonville was worsted by one armed with the sabre only. In addition, the modern French dragoon, with his brief period of service, finds difficulty enough in wielding his sabre when mounted; what then will be the state of his equilibrium when a lance in his right hand deprives him of the use of the "aids"? The inability of lancers to perform certain duties which fall to the lot of cavalry, and require the use of fire-arms, also complicates the question. Already the brigade of cuirassiers attached to each independent cavalry division is a sufficient encumbrance (since they do not perform outpost duties), and it is now intended to increase this nuisance by depriving the dragoons of half the men who are efficient for dismounted duty. J. C. B.

COMPOUND AND STEEL ARMOR PLATES.

We have received from MM. Schneider, of Creusot, the following communication, which to a large extent explains itself. We have commented on the controversy in another page.

The trials made at Portsmouth on board the *Nettle*, in March and May, 1888, against a compound and a solid steel plate of Messrs Cammell, have been instanced by Sir Nathaniel Barnaby, at the Institution of Civil Engineers, as a proof of the remarkable qualities of compound plates, and of the superiority of these plates, and even of the English solid steel plates, over the Schneider plates of the Creusot Works. It would have been preferable, we think, to compare first these results with those carried out for a number of years against iron plates. Such an examination would, perhaps, have modified the convictions of Sir Nathaniel Barnaby.

The Holtzer projectiles used against the *Nettle* plates are generally little deformed, or set up. Their striking energy had been absorbed almost wholly by the plates, exactly as in the case of iron plates attacked by chilled cast iron Palliser projectiles, or others of good quality.

Elements of Nettle firing of March and May, 1888.

a = calibre of 6 in. gun = 152 mm.

ρ = weight of 100 lb. projectile = 45.3 kilog.

V = striking velocity of projectiles = 1976 ft. = 602 m.

Striking energy = ρv^2 = 16,416 metrical tons.

E = thickness of plate = $10\frac{1}{2}$ in. = 266 mm.

If the plate had been iron it would have been perforated by an energy given by the well-known formula used at Gâvre.

$$\rho v_1^2 = a \times \overline{1600^2} \times E^{1.4},$$

in which a and E represent in decimetres the calibre of gun and thickness of plate. Thus ρv_1^2 = 15,300 metrical tons.

$$\text{The relation } k = \frac{\rho v^2}{\rho v_1^2} = 1.073$$

The striking energy employed in these rounds is, then 7 per cent. greater

than that with which the same projectile³ would have perforated an iron plate of the same thickness. In examining the effects observed as to penetration we arrive at the following conclusions:

Compound plate.—First round. Penetration³ = 290 mm. The point of the projectile projects beyond the back face of the plate by 24 mm. Second round. Penetration = 302 mm. The point beyond the back face of the plate by 36 mm. Fifth round. Penetration = 278 mm. The point being beyond the back face of the plate 12 mm. These three projectiles give a mean penetration of 24 mm. of the point of the projectile beyond the back face of the plate.

Steel plate.—First round. The base of the projectile is 146 mm. beyond the back face of the plate. The penetration of the point is 321 mm. beyond the back face. The plate is then completely perforated. Second round. Penetration 328 mm. The point passed the back face of the plate by 62 mm. Fifth round.⁴ Penetration 402 mm. The point passed the back face of the plate by 136 mm. These three projectiles have a mean penetration⁵ of 133 mm. of the point beyond the back face of the plate.

These figures show for the steel plate, which Sir Nathaniel Barnaby considers as not having been equalled by a Schneider plate, a resistance hardly greater than that of a plate of iron. The compound plate has shown a little more resistance, but a little more energy would have sufficed for its complete perforation. These two plates are not broken; no appreciable crack is visible. It is true that with a similar blow the same result would have been produced on a plate of ordinary wrought iron. Sir Nathaniel Barnaby might have then almost demanded for protection against chrome steel projectiles, that he should turn to wrought iron plates, and abandon compound plates as well as those of steel.

The trials made on February 8th last at Shoeburyness with Krupp projectiles of 15 cm. against two Cammell compound plates of 23 cm., with a value of $k = 1.17$, that is to say, with⁶ 17 per cent. of energy beyond the penetration of iron of the same thickness, have given analogous results to the preceding as to resistance of penetration. The projectiles have completely perforated without deformation, but the plates have exhibited important cracks, as may be seen from the photographs given herewith and, what is more serious, notable pieces of the steel face have been detached.

To our knowledge Holtzer projectiles of 15 cm. have not been fired against Schneider plates of a thickness of about 266 mm.; but it may be interesting to quote a round fired in 1880 with a gun of 16 cm., with steel projectiles made at Creusot. These projectiles behaved like those of chrome steel in deforming—or setting up—but little, and nearly the total amount of the energy was absorbed by the plate, as in the case of the rounds we have just examined.⁷

Elements of trial.— a = Calibre of naval gun of 16 cm.

p = weight of steel projectile, 45 kilos.

v = mean striking velocity, 468 m.

Energy (striking) $p v^2 = 9.833$ metrical tons.

The thickness of the plate was 183 mm. If it had been iron it might have been

perforated by a striking energy calculated by the Gâvre formula of $p v^3 = 9,620$ metrical tons.

$$\text{The relation } \lambda = \frac{p v^3}{p v_1^3} = 1.017.$$

The energy employed then was 1 to 2 per cent. greater than that which would have perforated iron of the same thickness. This ratio is from 3 to 6 per cent. less than that which we have calculated for the English rounds of 1888.

The points of the projectiles are at the following distances short of the back face of the plate:—First round, 23 mm.; second round 22 mm.; third round, 5 mm., giving a mean of 16 mm.

Proof of Krupp's bin. Armor-piercing Shot (First Lot of 300) Against Cammell & Co's qin. Compound Plates, February 8th, 1889.

No. of round.	No. of shot.	Weight of shot.	Diameter of shot.	Length of shot.	Charge.	No. of plate.	Range.	Velocities.			Striking energy.
								Observed.	Muzzle.	Striking.	
		lbs.	in.	in.	lbs.		yds.	ft.	ft.	ft.	f.-t.
2514	a	99½	5.971	17.35	44	4056 C	81½	1873.5	1887	1864	2397
2515	119	99	5.967	17.33	44	4056 D	80½	1868.5	1880	1858	2370

RESULTS.

Round 2,514.—Shot hit 2½ in. right and 1 in. above centre, and penetrated. Found in fourth layer of backing, whole and without cracks; set up 0.05 in. in diameter at shoulder and reduced 0.29 in. in length.

Round No. 2,515.—Shot hit 3 in. above and 1 in. right of centre, and penetrated. Found in fifth layer of backing, whole and without cracks; set up 0.016 in. in diameter at shoulder and reduced 0.093 in. in length.

Forwarded to Fred. Krupp with photos,

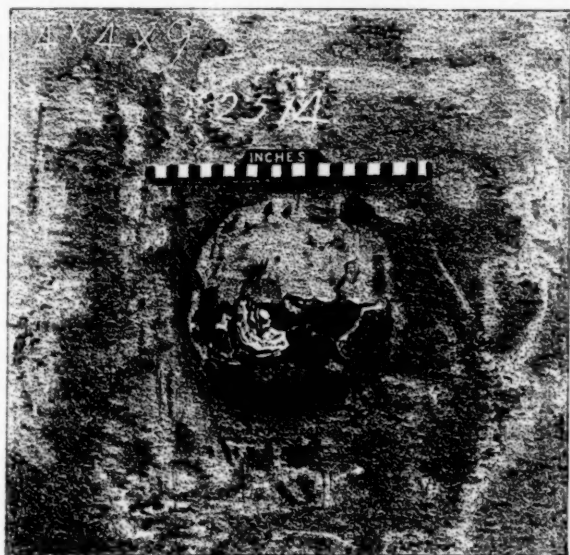
(Signed)

C. F. HADDEN, Capt. R. A., I. L. S.

March 6th, 1889.

This result is, as we see, better than that shown at Portsmouth, and it is against a sample of the manufacture of 1880, of a make abandoned because the plates did not present sufficient resistance to penetration.* These facts may be submitted without comment. We admit that the hard steel of the compound plates breaks projectiles of medium quality more easily than the less hard solid steel plates, because the fire only acts on the exterior layer. The compound plate when well backed then, as is the case in the Cammell plate instanced—which is the perfection of the type—ought to have the superiority. This would be absolutely exhibited with ordinary cast iron projectiles.

But when this hard exterior layer is powerless to break the projectile immediately; when it allows of penetration, either because of its small thickness in relation to the calibre, or because of the quality of the projectile, the compound plate is necessarily inferior to the solid steel plate, which continues through its entire thickness to oppose penetration energetically. This is proved incontestably to any impartial person by the rounds on their plates—up to 10 or 12 cm.—with chilled cast iron projectiles of 16, and above which will not break on these thin plates, and the blows with chrome pro-



Effect of Projectiles on Armor Plates. See page 740.



Krupp 6in. Steel Shot, After Rounds 2514 & 2515. See page 740.
(From *The Engineer*, London.)

jectiles of all calibres of the kind. Consequently, the French Navy have adopted for proof trials of these projectiles, of solid steel plates exclusively.—*The Engineer, London.*

NOTES.

¹ It appears to be useless to include in this analysis the rounds of chilled cast iron projectiles; the elements of comparison between the different types of shield attacked with these projectiles are numerous and well known. On the other hand, very few rounds have been fired with excellent steel projectiles of small calibre against plates of a greater thickness than $1\frac{1}{4}$ calibres—exactly 1.74.

² Or with a chilled cast iron Palliser projectile, or other if unbroken, or without appreciable deformation, or being fired against iron.

³ The total length of the projectiles was 442 mm., and the indicated penetrations result from the comparison of this length with the position after impact of the base with regard to the front face of the plate, without reckoning the metal heaped up by the projectile beyond the original position of the back of the plate.

⁴ The third and fourth rounds were fired with chilled iron Palliser projectiles.

⁵ We have by these means brought back the penetration of the point of the first round 300 mm. instead of 321, so as to make the commencement of the ogival coincide with the back face of the plate which, under these conditions, offers no further resistance to the passage of the projectile.

⁶ In France a Schneider plate of 23 cm. to 24 cm. would have served for the trial of chrome projectiles of 24 cm., of 144 kilos weight, with a striking velocity of 305 m., having for k a value of 1.66, that is to say, 66 per cent. more energy than would have perforated the same thickness of iron.

⁷ The round against the sample plate of Nordenskjold was carried out in June, 1880, at a time when MM. Schneider had found it necessary to change their manufacture on account of the success obtained at Gåvre in April and May, 1880, by a compound plate of Cammell's, attacked by chilled cast iron projectiles. We know that this success was such that the French Navy gave an important order to the factory of Messrs. Cammell, and engaged many French factories in making compound plates on the Cammell process. The Nordenskjold plates are anterior to the Terrible plates made in 1881 by a system of make of Schneider's plates, which was then brought in, and is followed up to the present time.

⁸ One plate of the same make had been fired at Gåvre in April, 1880, at the same time as the compound Cammell plate of which we have spoken, and had allowed a notably great penetration of chilled iron projectiles which it hardly broke.—Ed. E.

M. SCHNEIDER ON THE "NETTLE" TRIALS.

We give on another page an answer to Sir Nathaniel Barnaby's expression of opinion on the *Nettle* plate trials. Sir Nathaniel considers that these trials showed that not only were the English compound of steel-faced plates superior to the solid steel plates of Creusot, but that the solid steel English plates had also shown greater powers. To this Messrs. Schneider make the reply we have printed elsewhere. Messrs. Schneider's general position is reasonably expressed, and the ground taken is new to us and well worthy our attention, especially couched as it is in sober, matter-of-fact language; and we feel indebted to Messrs. Schneider for such a communication. As we understand them, their position is as follows: A compound of steel-faced plate has peculiar power to break up projectiles of medium quality, because the face is formed of extremely hard steel. Against such projectiles it acts to the greatest advantage. Projectiles are now, however, made, such as those of chrome steel, which are more than a match for the hard "face plate." Projectiles of large calibre may do the same without extraordinary excellence; and this "face plate" once overcome, the resistance of the soft back is small compared with that of the solid steel.

This statement rests on features which we ourselves have recognized before now. As hitherto made, we have pointed out that the compound plate, with a wrought iron foundation making up two-thirds of its thickness, has "less bone in it" than the solid steel. It, therefore, depends more on its

backing. We have pointed out that the stringent requirements of our naval authorities as to cracks in the back have made a soft back, and one with low tensile strength, an absolute necessity; for whatever may be the power of elongation of metal under statical strain, it yields by fracture under fire in preference to elongating, unless such elongation is easily effected. Hence Messrs. Schneider's position is then perfectly comprehensible and reasonable. It is necessary, however, to prove that it is true, not merely that such a result might be reasonably looked for. Messrs. Schneider give us an example taken from an experiment in 1880, and that with a projectile possessing less power to perforate the plate opposed to it, than the shot fired at the British plate on board the *Nettle*.

Messrs. Schneider say that plates have improved since then; but so also have projectiles, and the fact that these quoted are very little deformed does not put it out of the question that they may have lost something of the sharpness of form and point so admirably retained by chrome projectiles or those of Krupp, comparatively recently manufactured without chromium. Messrs. Schneider say that solid steel plates are now thought to be necessary for the proof of projectiles in France. If so, may we not naturally ask why we are not favored with a more recent result than one of 1880? Surely a plate of greater thickness compared with the projectile than that instanced as the usual test must occasionally be attacked. In the *Engineer*, of February 1st last, we gave a report of a Schneider solid steel plate tried in Sweden for the *Gota*; a result which we thought less satisfactory for the plate than those of the *Nettle* plates, chiefly because there were obviously "through cracks." The projectiles employed unfortunately were chilled iron, and from Messrs. Schneider's point of view now given to us, this comparison might not be considered to carry weight, because the chilled projectile might be held, and reasonably so, to be specially liable to be broken by the hard steel face of the compound plate, and consequently to come under the head of the inferior projectiles which are specially well kept out by compound plates. Messrs. Schneider, however, have referred to Shoeburyness.

At the present moment there are standing on that proof ground a sort of army of plates of 9-inch thickness, which have been used for the proof of steel 6-inch projectiles. Among them will be found many compound and a few solid steel plates, and while the latter have performed remarkably well, especially in one instance, the feature of through cracking is specially observable as compared with the compound, where the work is done in bulging. We do not lay stress on these results, except this general feature, for the quality of the projectile must be known in each case to enable a fair comparison to be made, and this we are not in a position to give. For ourselves, we do not wish to lay too much stress on through cracking. Far from it. We have long held that our own authorities have gone too far in their opposition to solid steel. We believe that a total maximum of resistance to projectiles is best secured by hardness, not only in the face-plate, but entirely through, such as can only be obtained at the cost of some liability to through cracking, a good system of bolting being relied on to hold up the cracked plate and retain a considerable measure of resisting power should the ship be struck again on the same plate; and for the plates carried on

cruisers, where it is everything to keep out one or two blows with a comparatively thin plate, we should use much harder armor, even at the cost of bad fracture. In saying this, observe we by no means give up the compound principle. We only employ it with harder metal, the face still being very much harder than the back. Our contention has been that the compound principle is a sound one. That is to say, that it is better to have a face whose hardness exceeds that of the body in a much greater degree than can be given by hardening the face of a mass composed throughout of metal of the same quality. The want of homogeneity, we think, may do more good in preventing through cracks, than evil in allowing the steel face to strip off.

With regard to the figures on which Messrs. Schneider base their calculations, we would observe that we have given them exactly as we received them. We do not mean by this to accept them as representing our experience. In England we have always considered that the penetration of wrought iron to steel-faced or solid steel is as five to four, and we could instance trials made in Russia and Italy which appear to suggest that the same impression prevails in those countries. Consequently, we do not for a moment accept the paternity of the conclusions arrived at by Messrs. Schneider as to what wrought iron would have done. In detail, the analysis of the calculations of Messrs. Schneider is not as quickly made as we hoped on inspecting such simple figures, because there are mistakes in the figures such as always cause a little trouble and delay. To begin with, 6 inches is not equal to 152 mm., but to 153 mm.; 10.5-inch does not equal 266 mm., but 269 mm. More serious mistakes occur concerning energy, etc. We do not, however, want to raise difficulties, because we feel indebted to Messrs. Schneider for the communication, and are impressed with the courteous and fair tone of it. We only wish that they could supply us with recent results obtained by steel projectiles against solid steel plates, and we again express our regret that they did not see their way to come to terms with the Admiralty for competition on board the *Nettle*.—*The Engineer, London*.

GRENFELL SIGHT.

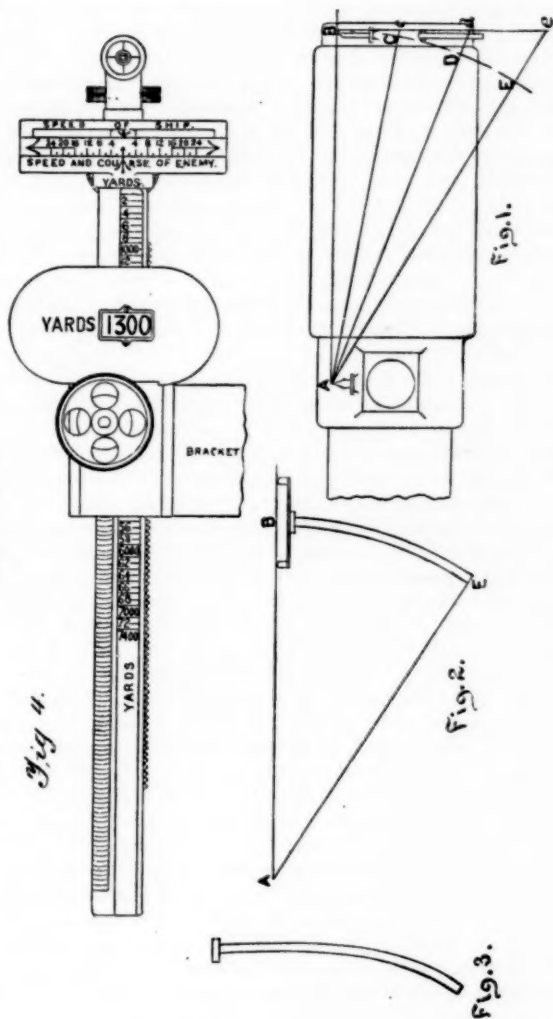
Captain Grenfell, of the Elswick Ordnance Company, has invented an improved sight for great guns, the principle of which may be explained in a few words, as follows:

The usual method of sighting a gun is shown in Fig. 1, in which A is the front sight and B the head of the straight tangent bar. Now, if with A as a centre and AB as a radius, a portion of a circle be described, the arc will represent the movement of the head of the rear sight as the muzzle of the gun is elevated.

Take on this arc the points C, D, E, each representing, say, 5° of elevation; then the lengths of the arcs BC, CD, DE, will be equal. If the lines AC, AD, AE, be prolonged until they cut the vertical line which represents the sight bar, the lengths Bc, cd, de, will give the necessary movement of the vertical bar to correspond with BC, CD, DE, and it will be seen that these lengths are no longer equal but continually increase.

It is clear that the fore sight A is an essential part of this method of

Grenfell Sight



sighting. It is also clear that if instead of a straight bar, Be , a curved bar, BE , be employed, and at the head of it are placed two pointers on a short horizontal bar, or a telescope, these pointers, or the axis of the telescope, will always be directed toward the point A , whatever be the movement of the curved bar. (Fig. 2.)

It is evident from this that the point A may be suppressed, whereby it will be possible to use, instead of the fixed radius AB , any other radius which may be more suitable, when the sight with its two pointers, or telescope, will still act as before. It is also evident that by the method of using an imaginary pivot it is possible to use the same radius for all guns, with this advantage: It results from the present system that in small guns this radius is very short, and consequently the subdivisions on the bar for degrees and yards are extremely minute and difficult to discern, and in the case of large guns, where the radius AB is of considerable length, they are unnecessarily large, and the total length of the bar is excessive. But by the use of a curved bar and an imaginary pivot, such a radius can be selected as will give, in all cases and with all guns, the length of subdivision, and consequently the total length of bar, most suitable for general use.

Captain Grenfell also proposes a bar having a varying curve such as that shown in Fig. 3. By adopting the proper nature of curve, slow at first, or for ranges at which the trajectory is flat, and increasing the curvature as the range increases and the path of the projectile becomes more curved, the subdivisions on the yard scale can be made of equal length throughout, whereby those near the top are increased from minuteness to easy visibility, and those near the bottom are reduced to convenient proportions.

Having equal movements for each equal and determined movement of distance, it becomes an easy matter to apply an indicator which shall record the range used in large figures. Fig. 4 shows such an indicator applied to the sight bar of a 4.72 inch R. F. gun.*

THE GERMAN MANOEUVRES.

The special correspondent of the *Morning Post*, writing from Hanover on the 20th inst., refers to the effect of smokeless powder. He says: "During the whole of the day I accompanied the advance of the 14th Infantry Division. A little to the west of Osterwald we came upon the enemy, as we crept cautiously through the wood, and a rattling magazine-rifle fire was at once opened. Our corps (7th) used smokeless powder. The enemy (10th) used the old powder, and the results were most striking. The enemy appeared to be unable to determine our distance from them, while the heavy, damp atmosphere made the smoke from their rifles lie along the glades of the forest like masses of blue violets. We were continually getting within 200 to 250 yards of them, always enjoying splendid cover, for the ground was so broken that the officers dismounted and had their horses led. Nay, more, we frequently on the edge of the forest took them in flank sending forward two or three companies at the double, and they had to withdraw under a murderous fire from their rear and their right. They seemed utterly unable to guess whence the fire came, and, indeed, would have been

* Naval Intelligence Bureau.

next to annihilated before they discovered our whereabouts. After two hours' advance, driving the enemy before us in this fashion, we reached the edge of the forest, where it runs up the hill, leaving the plain at an obtuse angle. Here we found ourselves again on an open slope, which fell away before us down towards the village of Mehle, with its red roofs peeping through the lime trees. On the fringe of the wood our men lay down in splendid cover, and regardless of the artillery fire directed against us from a range of three miles, they punished the enemy terribly as he withdrew across the stubble-fields towards Elze, leaving Mehle low down on his right. I seized the opportunity of contrasting smokeless with smoky powder, and hurried towards Mehle to a position immediately between the advancing and retreating infantry. This was the aspect of the field. Upon the edge of the forest the advancing columns of the infantry of the 7th Corps, or those lying on the ground poured volley after volley on the retreating infantry of the 10th. It required keen eyes to distinguish the faint brown puffs of smoke which came from the fire of a whole company. Occasionally it seemed as if one of the old cartridges had got in by mistake amongst the new ones, revealing its presence by a little trail of blue smoke. And now, looking towards the retreating infantry of the 10th Corps, as they stopped from time to time to return the enemy's fire, from each single rifle came a trail of blue smoke, and from each company, as it volleyed, a cloud of dark blue smoke, which only strong wind dispelled. Up away back on the rising ground above Osterwald, is the corps of artillery belonging to the 7th Corps, booming as it shells the distant artillery of the 10th Corps. Here, too, are faint light-brown clouds of smoke, more like dust beaten from carpets than anything else. In the opposite direction, on the high ground above Elze, and on hillocks in the middle of Saale Valley, is artillery of the 10th, using the old powder, while clouds of blue smoke, like that from burning gorse, shroud their position, and must undoubtedly diminish the rapidity of their fire, as well as the accuracy of its aim; in fact, a whole battery of artillery with the new powder does not make half so much smoke as that made by a company of infantry with the old powder, and a whole company of infantry firing a volley with the new powder does not make half so much smoke as a single gun makes in firing with the old. Comparing battery with battery, the smoke from the corps of artillery of the 10th, is like the smoke driven out by a locomotive engine coaling up, while the smoke from the 7th corps of artillery is like the faint steam mingled with the brown coal smoke when the locomotive is at full pressure and glowing red. Such was the evidence of to-day's manœuvres. The 10th Corps, so stubborn in maintaining its positions yesterday, was totally at a disadvantage to-day against the 7th Corps, using smokeless powder, and had to fall back, with enormous loss, on Elze, where the fight for the railway line between Hanover and Alfeld will be resumed to-morrow. As I watched the battle from the points between the opposed positions, Prince Albrecht of Prussia, and with him old and cheery Field-Marshal von Blumenthal, hero of a hundred fights, rode up. For nearly an hour they held their horses still to watch the battle of smokeless against smoky powder, forming, with their suite, a little group between the con-

tending armies. The old field-marshal was eager in his criticism, while the stalwart Prince Albrecht, who bids fair to be the Prince Friedrich Carl of the future, viewed the scene with an earnest and intensely occupied air."

Writing on the 22d inst., the same correspondent says: "To-day we (the 10th Corps) had smokeless powder. The 7th had the old powder. Regarding the new powder, I would add the following to my last dispatch: 1. When the infantry were firing, a brown smoke was faintly visible from the flanks; facing their fire no smoke, or next to none, could be perceived. 2. The artillery officers say that the new powder is but half the weight of the old, thus enabling double the quantity to be transported. 3. The action of the powder in the tube of the gun is first expansive and afterwards explosive. In boating language, it 'gets catch on' at the end, and not at the beginning. The advantage of this may be tested with a common pea-shooter tube, blowing into the tube moderately till the pea reaches its mouth, and then giving a strong puff, the charge will go further and hit harder than if a strong puff is given at the beginning. So the shell or shrapnel gets started within the tube at a moderate velocity, getting finally the explosive push as it leaves the gun, having no friction from the bore to encounter any longer. 4. The powder, as an old general expressed it, 'stinkt ganz canibalsch'—stinks abominably. 5. Finally, the powder in exploding puts a greater pressure on the tube of the gun than the old powder, but new guns are nearly ready. The new powder which the French have, on the other hand, is said to be so precarious in its action that it has burst several guns, and is used with fear and trembling. The German powder, by the way, is not noiseless, and it seemed sometimes louder than the old. The new powder deserves the pressing and immediate attention of the British authorities, but above all of the Admiralty. It is in naval warfare, as any one who has seen a naval engagement will understand, that it is destined to achieve the greatest results. The smokeless naval gun will revolutionize naval warfare. I ought to add that Herr Krupp, of Essen, was present during the whole of the manœuvres watching the effect of the new powder on gun metal."

Referring to the new tactics, this correspondent says: "The next chief point in the manœuvres, especially yesterday, was the new tactics. Their principle is the increase of the responsibility of every individual officer in the action of companies decided, subject to the general plan of battle, by a company of officers. Yesterday the officers of the attacking Army Corps certainly exposed their men in an extraordinary way, but every one admitted that they could not help it, owing to the absence of cover. They advanced down hill in column, not in skirmishing order. In one case two companies of Chasseurs, picked men all, and imbued with the excellent conviction that they can do anything, possible or impossible, 'frank frisch froh und frei,' came close up under our infantry fire, appearing round the village gardens below the church just described. They would not retire or cease firing, although manifestly annihilated, so the umpire had to interfere, and allowed them to go off with the honors of war, on the principle that such rash tactics may occasionally, as a forlorn hope, storm a position or dislodge the enemy." He winds up a most interesting series of letters with some ob-

servations on movable fortifications: "Lastly must be mentioned the movable fortifications about which I wrote in the *Morning Post* last year, when Major Scheibert's treatise on the subject appeared. These fortifications are ironclad turrets on wheels, and resemble beehives. Inside sit two men, one on a saddle like that of a bicycle, the other handing him ammunition, of which 600 shot can be stored within. The turrets contain a quick-loading gun, firing thirty shrapnel shell or solid shot, the latter for use against cavalry. The turrets revolve, and are bullet and shell proof. The chief objection I saw to them is the difficulty of moving them. Horses were not available yesterday, and about twenty men, with their auxiliary force of villagers, were required to drag each of the eight turrets employed into position at the extremities of the infantry entrenchments. Smokeless powder was employed in the guns, but it gave a bright flash like artillery, so that the position of the turrets, which were painted the color of the soil, could be distinguished. But Major von Scheibert, with whom I spent half the day, warmly advocates them, arguing that even if artillery after much trouble had destroyed one, it would be a slight loss compared with the execution the turrets can inflict. Major von Scheibert is an opponent of all permanent fortifications. He says the French repent their expenditure on them, and instanced the fatal attraction of Metz and Strasburg during the last war for the French armies. The turrets were invented by the late Captain Schumann, and built by Gruson, of Magdeburg. The old officers call them 'tine,' or 'hand fire-engine,' which they resemble."

The *Times*' correspondent, writing from Berlin on the 22d inst., thus sums up the result of the manœuvres: "As for the equipment of the cavalry, it is to be noted that, in conformity with the personal wish of the Emperor, every kind of it is to be armed with the lance as its chief weapon, though not on this account will either the sabre or the carbine be discarded. It is a novelty, no doubt, to see hussars and cuirassiers careering down upon the opponents with crouched spears; but it is a more remarkable thing still for a combatant to be deafened with volleys of musketry, and not to be able to discern from what particular point the bullets that whiz about his ears proceed. This startling effect was due to the smokeless powder which was used alternately by the 7th and 10th Corps during the late manœuvres; but of course the disadvantage occurring to one of them would have been counterbalanced had both been at liberty to make simultaneous use of the new invention. The real value of the experiment consisted in showing under what an enormous disadvantage a combatant labored who propelled his bullets with the old smoky powder, against an enemy furnished with its comparatively colorless development. But this disparity in powder equipment is not likely to make itself felt in European warfare, as all the military Powers will doubtless hasten to adopt an innovation against the practical value of which no serious objection would so far seem to have been urged. This smokeless powder will at once rob war of much of its picturesqueness and add to its horrors, since dangers appear double when they are unseen; but after all it is still upon its trial. A preparation of the same smokeless powder was tried by the artillery, but here improvement appears to be still possible, and will doubtless soon be achieved or at least attempted. The employment of this

powder was the great and, as the Germans would say, 'epoch-making' novelty of this year's manœuvres, a novelty which will rank with the adoption of the needle-gun, but otherwise, they were not unfruitful in new departures that were as surprising as they were instructive, as witness the fortifying of an intrenched position with wire-fencing and revolving guns on movable ironclad turrets, not to speak of the employment of carrier-pigeons and dogs as the bearers of dispatches in lieu of cyclists, who have yet no recognized place in the German Army. As for the all-round efficiency of officers and men, as proved by these manœuvres, they richly deserved the unstinted praise which the Emperor bestowed on them before bidding good-bye yesterday to the two superb bodies of troops who had marched and fought under his eye for nearly a fortnight, and felt in better form at the end than the beginning.—*Army and Navy Gazette.*

INSPECTORS-GENERAL OF ARTILLERY IN GERMANY.

INTRODUCTION.

The radical changes which the field artillery has undergone, owing to the abolition of the Inspector-General of field artillery and to the fact that this arm, like the infantry and cavalry, is now placed under the general officer commanding districts, consist mainly of the following:

1. In future, the Supreme Court of Appeal, with regard to the details of the training of field artillery, will only exceptionally (that is, only when the general commanding happens to have served in the artillery) be presided over by an officer of the arm; the same rule will also hold good with reference to inspections.
2. The principles of the tactical employment of field artillery will henceforward be brought to light by the officers commanding the troops alone, and this during the exercises with the other arms; the superior officers of the technical arm will have nothing to do with the matter.
3. Personal questions, such as the career of the officers of the arm, judgment with regard to their efficiency, matters affecting their honor, etc., will henceforward come before the highest authorities through the generals of districts, and such questions will thus be dealt with in the artillery exactly as they are in the infantry and cavalry.*

While of late years we in England have been content to imitate German military institutions, and have always more or less followed the lead given us abroad by the nation for the time being looked on as the most formidable on the Continent, it is somewhat remarkable that, in a recent change of system, we have for once taken a line of our own, and have indeed reversed the usual order of things, and set an example which our neighbors have, perhaps unintentionally, copied. When we abolished the office of Inspector-General of Artillery, most people were considerably astonished at the boldness of the step, and not a few viewed the loss of so valuable an official with regret and apprehension. The value of an officer who could take a comprehensive and general survey of our artillery as a whole was immense; and in view of the many and various arms and equipments that go to form

* From *Royal U. S. I. Journal*.

the armament of our Royal Regiment, his watchful eye was an especial aid towards uniformity and consequent efficiency. Without his superintendence it will be certainly more difficult to preserve the same "oneness" which has been recently a notable feature in our batteries; and we question very much whether the paltry saving effected by the latest sacrifice to the Chancellor of the Exchequer will prove to be in the interests of true economy. Be this as it may, however, it is a noticeable coincidence that just at this time the Germans have likewise abolished a similar office in their Army, and that now their Field Artillery is to be placed immediately under the superintendence of the general officer in command of the other troops, in contradistinction to the system which formerly obtained in their Service.

It is further especially interesting to see the opinion of so eminent an authority as Prince Kraft on the effect the new *régime* is likely to have on the future of his beloved batteries, and accordingly we draw attention to the pamphlet the most distinguished artillerist of his time (as it is not too much to call him) has recently published, and especially commended to the attention of his comrades of the other arms. Prince Kraft has always been particularly anxious that the rest of the Army should appreciate and thoroughly understand the tactics and value of artillery, and has likewise insisted again and again in his admirable letters on the support and co-operation which the guns must on their part lend to their brethren both mounted and dismounted. His letters on Infantry and Cavalry were only less admirable than those he published on Artillery, and he therefore may be trusted to take a broad and liberal view of the relations between the three arms, and his opinion on the present matter is worthy of careful consideration. It is encouraging to us, who have started on a similar system, to find that he anticipates that the change will be for the good of the artillery in particular and the Army in general, and that he hails it with unmistakable satisfaction and confidence. By its provisions artillery will be brought more immediately in contact with the general and his staff, and will learn to forget the taint of eclecticism which the arm has been not altogether unjustly accused of fostering. On the field of battle all the arms must be subordinated to one control, and learn to act in the interests of the common cause, and with a spirit of unselfishness and self-sacrifice. That all the officers of the Army should be accustomed to come as much as possible in personal contact with one another, and more particularly with those who will have to lead them in the hour of need, is, in the Prince's opinion, highly desirable, and he considers that the latest regulations will have an important tendency towards producing such a state of things. In our Service, the days when the artillery surrounded themselves with mystery are happily over, but even with us the idea of a special inspecting authority perhaps may have had a tendency to develop a spirit of caste, and its abolition, therefore, will with us likewise in this respect be productive of advantage. We need only cursorily refer to some of the details which the Prince enters into with great minuteness. Small points of drill and tactics are discussed which would only be of interest to those immediately concerned, and moreover the Prince's views on certain questions are not accepted in their entirety by the German military public, to judge by some

observations a correspondent in the *Militärwochenblatt* has recently made upon them. Prince Kraft has, for instance, recommended that some portion of the artillery of a force on the defensive should be kept in reserve out of action so as to be available for the repulse of flank attacks, or for the counter strokes which an active defense should always be on the look-out for. The latest German artillery regulations, on the other hand, direct that every available gun of the defense is to be utilized in endeavoring to silence the guns of the attack, and the majority of artillery officers seem to favor the latter view. He likewise considers, in opposition to the prevailing opinion, that batteries should be taught to move singly into their assigned positions on the battle-field in place of doing so together in what we term brigade divisions. On these and a few other similar points the Prince seems to have provoked a certain amount of hostile criticism, but his remarks have in general been decidedly approved of, and there seems no doubt that the popular feeling is in favor of anything that appears likely to weld the various component parts of the Army more closely together, and ensure hearty co-operation and mutual self-reliance. The conditions of our Service are so different from those of the German Army that much of what is applicable to one has not the same reference to the other; but what has been said as regards a closer connection between the artillery and the rest of the Army has an equal force when applied to ourselves, and in this respect we, as well as the Germans, may welcome the altered arrangements with satisfaction. As we have previously pointed out, however, there are some circumstances connected with it which give us less cause for congratulation.—*United Services Journal*.

RUSSIAN 6-INCH WIRE-WOUND GUN.

An experimental Russian 6-inch wire-wound gun is reported to have withstood the remarkable test of 1,000 rounds, 500 of which were with 44-pound charges of prismatic powder and projectiles weighing from 127 to 136 pounds; 50 of the 500 rounds gave a mean pressure of 19.7 tons.

Mr. Longridge, who furnished the original design upon which the gun was constructed, adds, in a letter to the *London Standard*, that at the end of this series of 1,000 rounds the gun was taken to pieces, and a new A tube put in at a cost of something like \$500, since when it had fired upwards of 500 rounds, and the firing would be continued up to 1,000.

This is the same gun reported in No. VII., p. 355.

A second gun of similar construction fired about 500 rounds, when the tube failed at a point not far from the muzzle and well in front of the wire winding.—*Naval Intelligence Bureau*.

FOOT POWDER FOR INFANTRY.

A new powder is now used in the German Army for sifting into the shoes and stockings of the infantry. It is believed to consist of 3 parts of salicylic acid, 10 parts of starch, and 87 parts of pulverized soapstone. The mixture keeps the feet dry, prevents chafing, and rapidly heals sore spots.—*Royal Engineer Journal*, Oct. 1st, 1889.

Comment and Criticism.

I.

"Mobilization."

Brigadier-General William L. Greenleaf, 1st Brig., V. N. G.

IN my humble opinion, the comments of the daily press regarding the troops gathered in New York on April 30th, have had, as you very truly observe, a tendency to foster a false sense of security which cannot fail to have a bad effect on the volunteer service. I have observed, during a period of more than twenty years' service in the National Guard of Vermont, that the greatest obstacle to be encountered in the building up of an efficient militia in this State, and the same may be said of other States as well, is the too prevalent idea that if we should ever be in need of soldiers, our millions of able-bodied young men could step at once into the ranks and do the work of trained soldiers without any previous preparation. And while it is undoubtedly true that with the intelligence of the class from which our armies of the future are to be recruited, the work of instruction will be comparatively a light one, we must not carry the idea too far, or we shall wake up some fine morning and find that we have been hugging a delusion.

In reply to your questions regarding the Vermont troops participating in the Centennial parade, I would say that my command is the First Brigade, V. N. G., consisting of one ten-company regiment and one two-company battalion of infantry, and one four-gun battery. The headquarters of the Brigade are at Burlington, of the battalion at Newport, of the regiment and battery at Brattleboro. With the exception of the battery and one company at Brattleboro, no two organizations are located in the same town.

The question of being represented in New York had been discussed as early as the 1st of March, but as there were no funds available for defraying the expenses, nothing positive was known until the order was received from the Adjutant-General, under date of March 20th.

The movement was commenced on the morning of Monday, April 29th, and as it had been arranged to go via New London, Conn., some of the companies were obliged to make a long detour to reach that point.

The uniform of the command is being changed from cadet gray to the regulation uniform of the Army. Six companies and the battery are now in blue, the remainder in the old gray uniforms. The men are all supplied with blue army overcoats.

The infantry is well armed, having the new model Springfield rifle, calibre .45. The battery, when in New York, was equipped with twelve-pound brass Napoleons, very antiquated and entirely worthless. Since then it has received four 3" b. l. steel rifles of the latest pattern, which puts it on as good a footing as any volunteer battery.

The command is fully supplied with wall tents, which are in excellent condition; good blankets, new haversacks and canteens of the army pattern, but is without knapsacks or clothing bags. The State has a fair supply of axes, spades, etc., for camping purposes, but has no field-train or wheeled transportation of any kind.

The following table shows the time consumed by each company en route, and the number of miles traveled :

* Organization.	Station.	By Rail.	Water.	Total.	Time.	No. men.
Brig. Hd. Qrs.	Burlington,	295	125	420	25h. 10m.	7
Brig. Band.	Montpelier,	248	125	373	21h. 10m.	40
H. Q. 1st Reg.	Brattleboro,	121	125	246	17h. 30m.	17
Co. A, "	Rutland,	193	125	318	19h. 50m.	48
" B, "	St. Albans,	305	125	430	23h. 20m.	49
" C, "	Brandon,	208	125	333	21h. 26m.	51
" D, "	St Johnsb'ry,	260	125	385	21h. 23m.	46
" E, "	Barre,	254	125	379	21h. 55m.	49
" F, "	Northfield,	238	125	363	20h. 50m.	51
" G, "	Bradford,	210	125	333	19h. 56m.	50
" H, "	Montpelier,	248	125	373	21h. 10m.	46
" I, "	Brattleboro,	121	125	246	17h. 30m.	51
" K, "	Bennington,	248	125	373	22h. 30m.	50
H. Q. 1st Batt.	Newport,	290	125	415	23h. 15m.	4
Co. A, 1st Batt.	Newport,	290	125	415	23h. 15m.	48
" B, "	Richford,	333	125	458	24h. 50m.	48
Light Battery.	Brattleboro.	121	125	246	17h. 30m.	79

The State accepted no assistance from the Centennial Committee, and the men were quartered while in New York on the steamer City of Lawrence, which took them from New London. The men furnished their own rations, except coffee, which was supplied by the quartermaster department, and took a supply from home to last the round trip, with some additions made in New York.

There were no violations of orders to speak of, and the deportment of the men was in every way commendable.

So far as my own command is concerned, I have no suggestions to offer as regards future attempts at mobilization. Our quartermaster department is in very efficient hands, and I do not see how the arrangements made for this trip by General Gilmore could well be improved, though if the object should be to get the men to a given point in the shortest possible time, without regard to expense, of course an all-rail route would be preferable.

To my mind this occasion furnished no basis for estimating how speedily a body of troops could be concentrated at New York, or any other point on the Atlantic coast, in a sudden emergency, for the reason that they nearly all had from thirty to sixty days in which to make preparations.

The most that can be said of it is, that it demonstrated the ability of the United States to assemble at a given point, within a reasonable time, nearly 50,000 troops, comparatively well organized, and sufficiently well officered and disciplined to enable them to be handled promptly and without confusion, in one of the most difficult problems of massing a large body of men in the narrow and crowded streets of a city ever attempted in this or any other country. It showed what we have for material, and proved that with proper encouragement and concert of action on the part of the General Government and the several States, a powerful reserve force could be developed that would be a mighty power if the occasion should ever arise for its use.

BURLINGTON, VT., July 6, 1889.

Brigadier-General Peter C. Doyle, 4th Brig. N. G., S. N. Y.

The Fourth Brigade, National Guard, State of New York, with headquarters at Buffalo, consists of two regiments of infantry located at Buffalo, one of eight com-

panies, the other of seven; two separate companies—infantry, at Syracuse, Elmira and Oswego; and one each at Niagara Falls, Jamestown, Olean, Rochester, Geneva, Auburn, Penn Yan and Cortland; besides a light battery of artillery at Syracuse.

The earliest reliable information concerning this movement was received by telegraph, from the Adjutant-General, about the first of March. The official order, dated March 4th, reached headquarters, and, at the same time, the various organizations on or about March 5th. I am not aware that any preparations were made till after the receipt of the official order. The movement of this brigade to New York began on April 28th, by the West Shore Railroad and connecting lines. The troops were uniformed in the uniform furnished by the State of New York, with service dress-coat packed in knapsacks, and blouse and service trousers worn. They were also supplied with overcoats, knapsacks, canteens, haversacks, black helmets, fatigue caps, white canvas leggings, belt and bayonet scabbard, and armed with Remington rifle. The uniform coat and blouse are of dark blue, the trousers of lighter blue.

This command has no field train or ambulances. The brigade was quartered at Madison Square Garden, where a mattress and blanket were issued to each officer and man. The entire movement was made without any breach of discipline or infraction of orders. The entire train movement was made on time with remarkable facility. In my judgment, this was accomplished very largely by reason of the care and skill given to the movement by Gen. Sup't Bradley of the West Shore Railroad, in conjunction with the services of a member of my staff, a man practically familiar with the details of passenger transportation; also to special instructions imparted by Lieut. W. R. Hamilton, U. S. A.

I can say with confidence, as the result of my experience in the movement in question, that I can mass my brigade at Buffalo or on the line of the Niagara River, within twelve hours from receipt of orders, or at any other points on railroad lines, within my military district, within eighteen hours; or in the City of New York, within thirty-six hours; and this with an attendance of 75 per cent. of maximum strength.

My suggestions concerning better mobilization would be in the direction of practical marching work, which could be performed with present equipment, with the addition of an issue of blankets and the purchase of cooking utensils, horses for battery, and horses and wagons for wagon train, could be hired upon short notice; a movement of this kind would be simply introductory to grand manœuvres participated in by larger bodies of troops, including regulars.

The only fault I noticed in the recent movement was a lack of practical work, which of course, could not be avoided, as the occasion was one of parade. The subsistence of my brigade was contracted for in New York and at points on the line; hence the men did not have the very important experience of preparing their food.

BUFFALO, N. Y., July 30, 1889.

First Lieut. Guy Howard, 12th Infantry, A. D. C.

By General Howard's direction I have prepared the following memoranda to fulfil the request conveyed in your letter of the 1st inst., pertaining to the movement of regular troops to the Washington Centennial Celebration at New York.

The movement of regular troops (1150 officers and men) to New York to take part in the Centennial Parade, while successful as a minor military movement, was in no respect a mobilization which should give any sense of security not enjoyed before this movement of a few armed men, among thousands of other passengers, to and from New York.

The following regular troops were assembled for the purpose of parade April 30th last :

	Officers.	Men.		Authorized strength.
Cavalry,	7	105	(2 troops.)	136
Artillery,	64	828	{ 2 bands, 24 foot batteries, 3 light batteries, }	1272
Infantry,	16	130	{ 1 reg't, staff and band. 5 companies. }	278
Total,	87	1063	1150	1686
			Absent,	536

Per cent. of strength present, 68%.

More than half of this command would not be available for an army taking the field against an invasion, as it was composed of heavy artillery which would remain at sea-coast forts.

Artillery not equipped for the field with field or siege guns should only be considered as fortification troops in time of sudden foreign complications, and must remain scattered along the coast. Only infantry, cavalry and light artillery of the Regular Army are disposable for field service. And the chief lesson of this celebration is, that upon an emergency they will turn out about 68% of the authorized strength of organizations which are actually ordered into the field.

Further, the entire force of infantry and cavalry cannot be ordered away from present stations. For illustration, take the Department of Dakota, having 19 garrisons, nearly all of which are essential to safety, from Indians and lawless persons, of much property and thousands of people. Until new men could be organized and armed, of the 24 troops of cavalry, 1 battery of artillery and 60 companies of infantry in that Department, not more than 12 troops of cavalry, 1 battery of artillery and 36 companies of infantry, could, within a reasonable time, be withdrawn, and even this force only at great risk to the peace of the frontier. The per cent. of the authorized strength in these regiments would be still smaller, as they are more distant from recruiting localities, and, therefore, constantly have more vacancies in the ranks. But, reckoning it the same, each cavalry regiment would furnish 477 officers and men, and each infantry regiment 368 officers and men. Applying these figures to the whole line of the Army, a regular force might in an emergency be assembled within ten days at any point within our borders of

2825 cavalry.

476 light artillery, with 40 pieces, including 3".2 breech-loading, and 3" muzzle-loading rifles, mountain howitzers and Gatling guns.

3754 infantry.

7055 men instead of 25,000, as is popularly supposed. These troops would be supplied with camp equipage, ammunition and wagon transportation for the field.

A modern war would probably be over before the remainder of the Regular Army could be replaced in its present duties by volunteers.

Though the transportation of such a small number of troops, as those of the Regular Army, brought to the Centennial, can give little indication of either the possibilities or difficulties in time of War, a brief mention of the inception and arrangement may prove of interest.

April 2. The Quartermaster-General called upon the Chief Quartermaster, Division of the Atlantic, for report of the cost of transportation of certain troops to New York and return to their posts, which report was obtained through the Depot Quartermaster at New York City and forwarded on the 8th.

April 9. The Quartermaster-General submitted to the Secretary of War an estimate of cost at about \$7200, which was approved April 13th.

April 9. A letter from General Schofield to Secretary of War recommended that instructions be given to Depot Quartermaster and Commissary of Subsistence in New York City to provide for troops to be assembled. (These depots are not under the orders of the Major-General commanding the Army.)

April 13. Letter from Headquarters of the Army to the Commanding General of the Atlantic, directed him to assemble certain troops for the Centennial on May 28th (a copy to the Quartermaster-General, who directed the Depot Quartermaster at Washington to arrange for transportation of troops from Washington City and Depot Quartermaster at New York to arrange for transportation of the other troops) amended by telegram of 18th, troops to arrive on 27th.

April 19. S. O. 90, Division of the Atlantic, directs the movement. * * *

April 19. Chief Quartermaster furnished a copy of the above order, and called on Depot Quartermaster, New York City, for certain transportation.

April 22. By telegram, troops from Washington City were excepted from assembling on the 27th. They will arrive on 28th.

April 24. Letter from Depot Quartermaster, New York, to Chief Quartermaster, Division of the Atlantic,* giving in detail the proposed manner of transporting each body of troops to its place of encampment in New York City at Governor's Island. (See note.) The troops were returned to their posts by May 2d and 3d.

There is no such thing as mobilization in our Regular Army. Our laws do not create reserves. The Army, such as it is, is always on a war footing. We must not consider the Regular Army as having more than ten thousand men that can be used for a field army in time of War, and there is no way of replacing losses. The remainder of the Army, even if not at war, is engaged in duties that cannot be dropped. For the number available for the field, we have sufficient camp equipage and transportation from year to year. We do not keep pace with improvements in weapons.

The Army loses by discharge, death and desertion about 6000 men each year. To make each organization available at its authorized strength, a margin of several thousand should be allowed by law to be enlisted in excess of the 25,000, and drawn upon from depots to fill vacancies as soon as they occur. In this way the real strength, as well as the nominal, would be 25,000 men, and there would be a reserve of partially drilled men to replace the first casualties of War.

The chief lesson of the Centennial, so far as the Regular Army is concerned, is that troops enlisted as ours are, can never never turn out at a designated day more than 60 to 70 per cent. of the nominal strength of their organizations.

GOVERNOR'S ISLAND, July 12, 1889.

* New York Depot of the Quartermaster's Department, }
Army Building, Whitehall Street, }
NEW YORK CITY, April 23, 1889. }

Colonel Charles H. Tompkins, Chief Quartermaster Div. of the Atlantic, Governor's Island, N. Y. H.:

SIR—Referring to my communication addressed to you on the 20th instant, I have the honor to report that the following arrangements have been made for concentrating the U.S. troops, ordered to assemble in New York Harbor on the 27th instant by S. O. No. 90, c. s. Headquarters Division of the Atlantic, viz.:

Headquarters band and companies A, D, G, H and I, 11th Infantry to leave Sackett's Harbor by special train, on the afternoon of Friday, the 26th instant, and proceed by Rome, Watertown and Ogdensburg and Delaware, Lackawanna and Western Railroads to Hoboken, N. J., arriving at latter named point about 8 A. M., Saturday, the 27th. Command to embark on steamer *L. M. Starin*, and be conveyed to Governor's Island.

Batteries D, I and G, 3d Artillery, to leave Baltimore on the morning of the 27th by Baltimore

Lieut.-Col. E. G. Bush, 11th Infantry.

In reply to the questions asked in the letter of July 1, 1889, I would say :

1st. The troops were, Headquarters, Band and Companies A, D, G, H, and I, 11th Infantry, U. S. A., stationed at Madison Barracks, N. Y.

2d. Earliest reliable information as to the movement was received about April 12th.

3d. Official order received April 21st, 1889.

4th. Tents were forwarded to Governor's Island, N. Y. Full dress uniform, extra clothing, rubber blankets, etc., packed up, specials drills, etc. Transportation arrangements were made by Q. M. D., U. S. A., in New York.

5th Movement commenced 5 P. M. April 27th, by R. W. and O. and D. L. and H. R. R. *via* Utica, Scranton and Hoboken, which place was reached at 11 A. M. April 28th. Troops were transferred by steamboat to Governor's Island soon after.

6th. The uniform worn *en route* was U. S. Infantry undress uniform, leggings and overcoats, clothing bags packed, haversacks, canteens, McKeever cartridge boxes, Springfield rifles, calibre .45".

7th. Command has full field equipments.

8th. No transportation for field service, excepting one ambulance.

9th. Troops were quartered in Castle Williams and cooked their rations (except bread) at camp fires.

10th. I noticed no violation of orders.

11th. There should be better agreement between R. R. Co.'s as to transportation contracts and a ready means of adjusting misunderstandings and supplying extra cars when needed.

12th. Take more time, use more money for transportation, organize local troops for first emergencies, and bring up other troops later. Have no full dress, or parades. Have post of duty and definite work assigned to each organization. Do not try to do too much with trains which are arranged to carry passengers (as well as troops) without

and Ohio and Central R. R. of New Jersey, arriving at Communipaw, New Jersey, in the afternoon same day. This command will be conveyed to Governor's Island by the steamer *Chester A. Arthur*.

Headquarters band, Light Battery B and Batteries E, G and L, 4th Artillery, will leave Newport, R. I., on the evening of Friday, the 26th, by the Fall River Line steamer, arriving foot of Murray Street, this city, about 6 A. M., Saturday, the 27th. The foot batteries and their baggage will be transferred to Governor's Island, and the baggage of the Light Battery B to Fort Hamilton by the *L. M. Starin*, the Light Battery to proceed to Fort by Ferry and Whitehall Street to 35th Street, South Brooklyn, and march to post.

Battery I, 4th Artillery, to leave Boston on the afternoon of Friday, the 26th, proceed by Old Colony Railroad to Newport in time to connect with steamer of Fall River Line, to reach New York City, Saturday, the 27th. This command will also be conveyed to Governor's Island by steamer *Chester A. Arthur*.

Suitable arrangements have also been made to transfer the foot batteries (now stationed at Washington Barracks) and their baggage from Jersey City to Governor's Island, Saturday morning, and the transfer of the troops and the light battery that are to arrive from Fort Myer and Washington, Sunday morning, will be promptly attended to.

The steamer that is to transport the baggage of Light Battery B, 4th Artillery, to Fort Hamilton on Saturday, the 27th, will receive on board at the latter place Batteries E, H and I, 5th Artillery and band, and at Fort Wadsworth Batteries K and M, 2d Artillery, and B, 5th Artillery, and their baggage, and transport same to Governor's Island.

Arrangements will be made to convey the troops to this city and back to Governor's Island during their encampment at latter place at such time as may be designated by Division Commander.

Very respectfully, your obedient servant,

(Signed)

J. G. CHANDLER,

Deputy Quartermaster-General, U. S. Army.

P. S.—The use of a dock has been secured foot of 35th Street, North River, for embarkation of the troops after parade, Tuesday, April 30th.

giving the railroad officials due notice. In case of need, stop passenger and freight traffic and utilize box cars for transportation of troops and supplies.

MADISON BARRACKS, N. Y., July 6th, 1889.

Captain James E. Pilcher, Medical Dept. U. S. A.

A most surprising feature of the concentration of troops at the Washington Inaugural Centennial, was the deficiency of the sanitary service. If, as has been stated, the object of the collection of troops was to make a display of the military resources of the country, the result demonstrated a sad condition of affairs in the medical department. It would be a misfortune indeed for such a belief to gain currency with regard to the regular service, for as a matter of fact under the present able administration, the medical department is in a singularly efficient condition.

The movement could hardly be called a "ceremony," attendance upon which is not required of the hospital corps, because considerable travel by rail and boat, an encampment of varying duration and a long march through the streets of the city, united to give it rather the character of a manoeuvre of some considerable extent.

The sanitary department of the regular forces was represented by four medical officers and three acting hospital stewards; there were also probably a number of company bearers, but owing to the fact that the brassards distinguishing these men are worn only during active hostilities, their existence was not apparent. No privates of the hospital corps were attached to the command. Two regulation ambulance wagons followed the U. S. Army brigade.

The State forces presented various stages of sanitary evolution. The Fourteenth Ohio, alone presented the semblance of a hospital corps, but whether the members constituted a properly enlisted sanitary detachment or whether they were simply men detailed from the line and wearing the hospital uniform, the writer is not informed. The New York forces presented company bearers, three to each company, distinguished by the brassard and marching with their companies, with, in some instances, a small detail of bearers bringing up the rear of the regiment. The Pennsylvania troops were accompanied by regimental bearers, fewer in number, but marching in the rear of the regiment and not with the companies upon the rolls of which they were carried. This organization appeared to be the favorite one and was adopted in most other cases where any effort at sanitary organization was apparent. A number of regiments were accompanied by ambulance wagons and the regimental hospital steward usually formed a part of the regimental non-commissioned staff.

The medical officer was generally present on the staff of regimental commanders and general officers, but not a few instances were cases, not of the monstrosity called acephalia—headlessness—but of asomatism—bodylessness! For the medical officer comprised in his person the entire sanitary organization of his command. The fact is startling that many bodies of troops then were absolutely devoid of sanitary organization, and further that in not a single instance was there a complete sanitary equipment, while in even a large minority of these there was none at all!

In connection with the encampment of the regular troops at Governor's Island, no general system of care for the sick was provided. Medical officers with acting hospital stewards accompanied three of the detachments, and were responsible for the health of their own men. The members of the other detachments, however, were compelled to fall back upon the mercies of the medical officers stationed at Governor's Island for medical attendance. No brigade organization was attempted, nor was any other concerted arrangement for medical work apparent.

A point brought out in connection with this movement was the inconvenience of not having the company bearer's brassard constantly worn. The advantage of being

able readily to distinguish men trained in the handling of the injured is of value to the medical or other officer seeking assistance at any time, and particularly so when he is not familiar with all the individuals of his command, such as must necessarily be the case in any extensive movement. This advantage is strongly supplemented by the favorable effect upon the *morale* of the bearer, himself, afforded by wearing a badge testifying to his superior character and acquirements.

The matter of complete sanitary organization inaugurated but two years ago is still in its infancy in our Service, and has not made a general impression upon the National Guard, although in some States—notably in New York—a very excellent system of bearers detailed from the line may be found. With the experience of three-quarters of a century in foreign armies to guide us, however, and with the magnificent foundation work done recently by the medical officers of our regular service, there certainly need no longer be any necessity for the absence of proper sanitary arrangements in any command either in garrison or in the field. Under existing regulations no such command can be complete without its quota from the hospital corps.

Moreover, the regular service is naturally the model from which the National Guard is moulded, and upon occasions when the two services are brought into contact, the purposes of instruction can be properly accomplished only by the display of a correct model. So, while, as in the present instance, no emergency demanding the presence of a considerable number of the hospital corps may occur, yet the teaching of the proper preparation for war demands that complete provision for the care of the wounded be invariably present.

In the present instance, had the full requirements of satisfactory sanitary service been carried out the sanitary department of the Regular Brigade would have been represented by 148 company bearers wearing the brassard and marching with their companies, and the rear of the brigade should have been brought up by a company of the hospital corps numbering two per cent. of the command—23 men—with a hospital steward and two acting hospital stewards. The sanitary force of the command then, numbering 174 men, would have been ample to meet any emergency.

In recapitulation the points worthy of note were :

A.—In the Regular Brigade, strongly emphasizing the fact, however, that the first two and the fourth of these defects existed in the present instance only, and *are not present in the sanitary organization of the regular service in general* :

- (1) The absence of any concerted sanitary organization either in camp or on the march.
- (2) The absence of any representation of the hospital corps as required by regulations for field service.
- (3) The absence of any means by which the presence of company bearers could be distinguished.
- (4) The great deficiency in the proper equipment either of the company bearers or the hospital corps.

B.—In the National Guard :

- (1) The absence of a hospital corps, without which no proper ambulance work can be accomplished. Bearers detailed from the line cannot be considered with any propriety as ambulance or sanitary corps, as has been improperly done in some commands, nor can satisfactory service be obtained from them.
- (2) The entire absence of any sanitary organization whatever in many commands.
- (3) The fact that even when bearers were present as details from the line—presumably a mere make-shift until a proper sanitary organization could be developed—they were insufficient in number. They should have numbered never less than four to each company.

(4) The failure to have the bearers properly equipped when present.

C.—*Conclusion.* And in the light of these most serious defects, we are led irresistibly to conclude that :

(1) From a sanitary standpoint we are exceedingly deficient in preparation for a possible war, when the regular and volunteer forces would necessarily serve together ; and that without the application of a proper remedy, another conflict would entail upon our armies a repetition of the frightful losses from neglect and the lack of prompt aid to the ill and injured that characterized the early years of the Rebellion.

(2) Immediate efforts to secure a satisfactory sanitary organization, modelled upon the excellent system working so well in the regular service, should be made by the State authorities. Such efforts would meet with the most cordial co-operation from the General Government, upon the part of which nothing would be omitted that would aid in perfecting their work, thus securing a complete sanitary organization throughout the entire military force of the country and a great reduction in the mortality of future hostilities.

FORT WOOD, BEDLOW'S ISLAND, N. Y., July, 1889.

II.

"Desertion in the United States Army."*

Brevet Major-General James B. Fry, U. S. A.

THE paper on desertion in the last JOURNAL is the best thought out, the most clearly stated and the most fully supported treatise I have ever read upon the subject. The author, Lieutenant McAnaney, takes advanced ground, but does he go far enough ?

He may or may not be right that no better class of recruits than we get "exists ;" but it is certainly true that our rank and file are good men and good soldiers, yet they desert.† After an able and thorough discussion of the subject, Lieutenant McAnaney attributes desertion to three causes : " 1st. The monotony of the soldier's life ; 2d. Its unnecessary restraints ; 3d. The low social position of the enlisted man." I regard the third as the main cause, and therefore the one to be dealt with. Lieutenant McAnaney holding that the enlisted man "*is a social outcast because of the uniform he wears,*" that his uniform is "a badge of disgrace," advises that when the soldier leaves his post for recreation, he be permitted to wear any garb he pleases. That touches the shadow rather than the substance of the trouble. It is the "disgrace," not the "badge," that ought to be removed. The enlisted man's social position is governed mainly by his social relations in the Service, and it would not materially improve his position in the community or his feelings to try to conceal his calling by changing his garb when he goes to town. Nevertheless, he ought to have the same latitude in that respect that commissioned officers have.

The enlisted man's "low social position" is not due to his uniform nor to the occa-

* JOURNAL of Sept. 1889.

† The evil has existed from the beginning. In 1825, the U. S. House of Rep. called for information upon the subject, and, in his report, Adjutant-General R. Jones said : "The records of the office furnish no data upon which any specific cause of desertion can be predicated. * * * The class from which a majority of private soldiers are drawn scarcely regards the circumstance of desertion as an act of turpitude. This erroneous appreciation of crime, superadded to the restless spirit, probably constitutes the primary cause of desertion. There is no good reason to imagine that it can cease to operate until the system which governs the rank and file of the army be so altered by legislative authority as may reasonably be calculated to induce enlistments from a less exceptionable class, whilst, at the same time a cheering hope in the prospective may serve to elevate the recruit in his new calling," etc., etc.

sional discreditable conduct of its wearers. The behavior of commissioned officers sometimes disgraces them in person, but it never makes the National uniform "a badge of disgrace," and the same is true of enlisted men. The trouble, as it seems to me, is not only independent of the soldier's uniform, but is independent of his conduct and merits. It lies in the fact that *Caste* is established *under* the military law, if not directly by it. That is to say, by *the system*, enlisted men, regardless of character, ability, conduct and manners, are fastened in a lower social position than commissioned officers. I see no remedy for this so long as an officer may be punished by Court-martial for "conduct to the prejudice of good order and military discipline," for associating with enlisted men. No matter how honorable the man may be, he puts himself in about the same social relation to the commissioned class by entering the ranks that the officer occupies who is dismissed from the Army for cowardice or fraud, in which case the one hundredth article of War says: "It shall be scandalous for an officer to associate with him." The iron rule of *Caste* fixes our enlisted men in a "low social position." We brought it with us from Great Britain, where *Caste* is a part of the governmental system, where men are born "noble" (?) But our Government is founded upon the declaration that "all men are born equal." We probably continued the regular army *Caste* of the mother country in the belief that it was necessary to discipline. But that it is hardly true now, if it was ever true. Within my recollection, discipline in the Regular Army was almost entirely of the knock-down-and-drag-out sort; and enlisted men were "bucked and gagged" by order, and branded and flogged by law. That has passed away, and while discipline has not suffered, we are now recruiting a better class of men than ever.

Discipline, that obedience and proper subordination upon which the military system rests, is and ought to be, as rigidly maintained among commissioned officers who belong to various military grades, though to the same social order, as among enlisted men. There is no better example of military discipline than that afforded by the U. S. Military Academy, where cadets and officers belong to the same social order, though the rules governing the official life of the former, are rigid and exacting beyond comparison. Nor are the cadets at all inferior in discipline to the enlisted men at the same post, one belonging to the higher, the other to the lower order.

Military service in our country in peace, whether in the National Guard or in the U. S. Army is voluntary; in the former there is no loss of "social position," and the discipline is good in many cases, and might be in all. What would become of the National Guard if the regular army *Caste* should be established in it?*

If the "low social position" of enlisted men is terrible when the service is voluntary, how much more terrible must it be when the service becomes compulsory, when the man is forced into it? Yet in our great wars we have had to resort to the draft, and must do so again if we ever have another serious war. No fairer and better method can be devised for the defense of the country when volunteering ceases, than to enroll the men of proper age and physical condition, and force them by lot into the ranks; but no greater injustice and tyranny is conceivable, than to force some men to fight for all, and to lose "social position," for doing so.

If the enlisted man's "low social position" is not necessary to discipline, it is unne-

*The following was clipped from the National Guard column of the New York Times, of September 22, 1890, since this article was written:

Asked the secret of his success as a drill instructor and commanding officer, the colonel of a prominent National Guard regiment said: "My course has always been to impress upon the raw recruit, on the first night, that he must do exactly what I tell him; that I am simply his master for the time being, and I must be obeyed implicitly—no back talk allowed. My principle has always been to treat every recruit as a gentleman, giving him plainly to understand, at the beginning, that his first duty was to obey orders cheerfully and promptly, without question or hesitation."

essary and wrong. If his social status could be made to depend upon his own fitness and merit, "the monotony of the soldier's life," the burden of its "restraints" and its everlasting "waiting," its almost hopelessness, might, it seems to me, be partly if not wholly removed. How this could be brought about, what the effects, immediate and remote, direct and indirect, would be upon enlistments, and upon other features of the military service, I do not venture to predict. I must, however, explain that I am not advocating social relations between those who are uncongenial, between the intelligent and the stupid, the learned and the unlearned, the cultured and the uncultured, the good and the bad. On the contrary, I am merely presenting for consideration the feature in our military system which forbids social relations between certain *members of the profession*, when all considerations of personal fitness justify those relations.

A young *gentleman* of good habits (the son of one of my old class-mates) is now an enlisted man in the regiment which his poor father died colonel of. Undoubtedly he hopes for advancement. What is the merit of the rule or sentiment which forbids officers who have known him all his life from keeping up social relation with him because he has begun at the bottom of the profession? Is not he, and are not all such as he, entitled to personal and social as well as professional support, comfort and encouragement from the commissioned officers and the community?

Lieutenant McAnaney says: "Legislation is not needed. The regulation making power can of itself apply the remedy." I am not prepared either to admit or dispute that proposition; but if the main disease is as deeply seated as I conceive it to be, it requires heroic if not legislative treatment. Furthermore, there are some subordinate matters which it may be difficult to manage properly without legislation, every article of war, whether obsolete or not, being law. For example: by the 32d Article, a soldier cannot absent "himself from his troop, battery, company or detachment without leave from his commanding officer," meaning probably special leave for every absence or "pass," as it is called; by the 34th Article a soldier must not be "one mile from camp without leave *in writing*;" by the 35th Article every soldier must "retire to his quarters or tent at the beating of *retreat*," which is at sunset. I suppose the real meaning is that when the soldier retires to his quarters or tent at retreat he must remain there during the night, unless called out for duty. If that is so the restraint imposed by this law concerning retreat, as well as the regulation restraint concerning tattoo, needs attention.

Our Army in peace being recruited by voluntary enlistments, both parties, the Government and the soldier, should have the privilege of terminating the engagement at pleasure, upon a settlement of accounts according to principles to be specified beforehand.

Brig.-Gen. M. D. Hardin, U. S. A.

I had not intended to write my views upon the Desertion Problem, although requested by you to do so, but since I made a few remarks in the discussion of Dr. Greenleaf's paper which have been misunderstood—please permit me a few lines.

My view of marking upon enlisting is, that this would run counter to the same public opinion, be liable to the same objection, as marking a deserter. In the last case, a law could be made—re-enacted—to permit this. It is doubtful if a constitutional law could be made to cover the first. I think Dr. Greenleaf's plan to register every mark on a man to be legal and legitimate and not subject to just objection, and, therefore, a good thing to do.

Now my thought, which I attempted to express, was this: "That we should endeavor to get at the cause or causes of desertion." I said: "I thought as we Americans claimed to be very smart (I meant very practical, possessing a great amount of common sense, etc.), that we therefore should find out the cause of desertion and

then apply the remedy—that this was far superior to any system of detection.” By the way, is not the number of deserters re-enlisting very small compared to the whole number of deserters? I think Lieutenant McAnaney and General Dodge, between them, have stated the principal causes of desertion, namely:

The natural restlessness of our American people, especially of the class from which the greater number are now enlisted—men out of work, etc., etc., in our large cities, the unnecessary restraints of garrison, the interminable drills, or repetition of well-known drills, the *ennui* of garrison life, and the social position of the soldier.

I don't believe *honest* work, work that a soldier can see does him or his surroundings some good, is ever complained of by good soldiers.

Men seldom complain of the non-commissioned officers until they have become dissatisfied from other causes, after which time they are ready to resent the simplest, most natural order of their non-commissioned officers, and then give both to themselves and to inquirers as their reason for deserting, abuse by non-commissioned officers, or sometimes, very rarely, by commissioned officers.

As to the remedies: If all shall be done that has apparently the unanimous approval of all writers upon this subject, little is left to recommend. Being of a most active temperament, I may exaggerate the necessity of keeping men busy, but my experience in active service and observation since, make me think, more can and should be done to give the men variety of employment and variety of amusements. Every prominent newspaper devotes at least one page of each issue to the subject of “Sports.” This shows that our people think very much on this subject. The soldier, being physically perfect and required to exercise in certain ways, takes an interest in this matter, and, no doubt, reads or hears read this page every day. Why cannot our Departments assist him in enjoying himself in this way? Even during the war I made it a rule to furnish amusement for the men when in camp. At one time I set up a ring and had officers of all arms practice “cutting heads.” The crowds that attended as spectators showed they enjoyed this “sport.” When near the water, being fond of swimming, I encouraged the men to go swimming. Every soldier should be encouraged to hunt and fish, not hindered, as they generally are. As to boating, being a small-boat maniac, I should say nothing, but if you had seen the men, as I have for several years past, looking with longing eyes at the Government boats, beating out their sides, bottoms, bows and sterns, and knocking down the Government's wharves for want of use, you could appreciate my feelings. But why go on? There is not a post in our country that could not be made a pleasant habitation for soldiers if every one, from its commanding officer up to the Honorable the Secretary of War, was disposed to do what he could to make it so.

NEW YORK, N. Y., Sept. 28, 1889.

Lieut. A. A. Cabaniss, 20th Infantry.

Lieutenant McAnaney's article—“Desertion in the United States Army”—is the best on the subject I have seen. He says truly of the enlisted soldier: “He is a social outcast, and because of the uniform he wears. * * * The general impression among civilians is that the Army is composed of the off-scourings of society.” In my opinion public sentiment concerning the relative merits of the faithful soldier and the deserter, with the *consequent* comparative immunity from punishment of the latter, has produced more desertions than all other causes combined.

There are two classes of deserters: first, those to whom their oath of enlistment is nothing; second, those whose desertion follows a debate between their desire to go and their respect for their oath. The member of the second class finally justifies his desertion by reasoning that his oath bound him to fulfill certain conditions of a contract

the other party to which—the Government—has failed to do or not to do all that he understood, when he enlisted, that it promised directly or by implication to do or not to do. The Government has been false to its agreement; therefore he is absolved from his oath, which he considers conditional.

The only question remaining for the would-be deserter of either class is, "Will it pay to desert?"

Public sentiment replies through an editorial in the *New York Herald*, winter of 1887-88: "The desertion of a private soldier is the first sign of the re-awakening of his self-respect." Through a United States Senator: "I will ask for your pardon." Through a very large class of civilians: "Nobody stays in the Army except worthless men, unable to make a living outside, and lacking the nerve and energy to desert. Those who do should be commended. We will aid and harbor them." Through another large class: "We do not care whether the ex-soldier is honorably discharged or a deserter, why he deserted, nor whether he be apprehended or not. That is the Government's affair, and none of our business. We will not become spies and informers for the sake of \$30, part of which must be expended in delivering the deserter to the proper authority."

Experience testifies through the unapprehended deserter writing to his old Company: "Am doing well, good wages, and better treatment generally than if I had a good discharge to show." Through the re-enlisted deserter advising: "Try it; fifteen chances to one you won't get caught, and if you find the outside worse than the Army you can re-enlist in some other outfit—just transfer to some other post and regiment without any trouble or 'red tape,' as I did." Through the convicted deserter writing from the Military Prison that he lives well, is learning a trade, and upon discharge may become, as did one within my knowledge, a "Government teamster" at \$50 per month, a terrible warning to the soldier at his side, doing the same work on fatigue at \$13 or on extra duty at \$23 per month, of the dangers of desertion.

Observation shows him the convicted deserter serving a few months' confinement at his own post pending dishonorable discharge or restoration to duty, getting every night in, with regular meals, and light work under a sentinel who brings him in from "hard labor" (1) in the afternoon to rest and sleep until seven o'clock the next morning, during which interval the sentinel walks post two hours out of six.

This evidence answers the question. Whatever his grievance, great or small, real or imaginary, the questioner deserts.

If the \$30 reward were increased, say to \$500, and the convicted deserter assured of imprisonment in a State penitentiary for a period at least equal to his unexpired term of service, and never less than two years, with loss of citizenship and the privilege of re-enlisting, desertion would soon become as rare as it now is common. Aid and sympathy are freely given when they cost the donor little or nothing, when no one denies the claims of the applicant, and when all his statements of long-endured wrongs are accepted without investigation. But if the average citizen knew that he would make \$500 by arresting a deserter, he would do it upon the first opportunity, and, by seeking, find arguments to justify his act in the eyes of himself and his friends. The consequent almost inevitable punishment of desertion would result in the discontented soldier's abandoning this present panacea for all his woes, and serving his time.

Lieutenant McAnaney's remarks concerning tattoo will be endorsed by every man of like experience. It is a hardship *even to the men by choice in quarters at the time*, since it breaks into their occupation, amusement or rest, and requires them in winter to change dress. Many men coming off guard or fatigue sit up during a long winter evening, awaiting this roll-call, who would otherwise be in bed and asleep an hour or

two earlier. Some captains recognize this by allowing their first sergeants to report "present" men whom they know are in bed.

Post traders should not only be *allowed* but *required* to furnish liquor of the same quality, at the same price, to officers and men alike. Now if the soldier buys it from the sutler, he gives treble value as the price of the risk to the seller, or pays exorbitantly for the villainous stuff smuggled in to him, or for which he goes beyond the Reservation and incurs punishment. This dissatisfies a large class of good soldiers, temperate men—not abstainers—who resent classification with minors, Indians, and occupants of penal institutions and insane asylums.

The general public has a poor opinion of the Army because it sees most of the poorest element—the noisy, the drunken, the deserter—reads slush about "elevating the moral tone of the Army," "the rich field for missionary work offered by the Army," etc., and is too indifferent to inform itself.

There are some low men among the rank and file, others as intelligent, high-toned and honorable as can be found anywhere. The great mass will compare favorably with the same number collected at random anywhere in the United States.

The foregoing opinions are the result of three and a-half years' enlisted service and a life-time residence (except six months at Fort Myer, Virginia) west of the Mississippi, embracing a personal knowledge of three-fourths of the military posts and neighboring communities in Arizona, California, Oregon, Idaho, Montana and Washington Territory.

FORT ASSINNIBOINE, MONTANA, Sept. 29, 1889.

Lieut. W. A. Campbell, 9th Infantry.

As a whole, I consider Lieut. McAnaney's article the best I have ever read upon this subject. The analytical part is certainly most excellent, and his portrayal of a soldier's life in our Army is only too true; but there are some points on which, I am sorry to say, I cannot agree with him. He says: "The quantity of food is always sufficient and the quality good, whatever may be lacking in variety." It is evident that he served at stations which had good gardens and plenty of vegetables, for no man who has lived on the straight Government ration for any length of time would make such an assertion.

The ration, as issued by the Subsistence Department, is not enough, being only sufficient to sustain life; and, by trying to make it suffice, the quality of food served to the soldier is rendered very poor. As there are but few stations in the Army where potatoes, onions, and other vegetables can be raised in sufficient quantities to supply the troops, it becomes necessary to make a "saving" on the ration, in order to purchase vegetables. Therefore, twenty rations of coffee and sugar are made to last a month; the fresh beef intended for seven days is extended to the tenth; and there is a general cutting down of the ration all round. By the addition of a pound of potatoes and an ounce of onions to each ration, the necessity of this "saving business" would be greatly decreased; the soldier could then appease his hunger three times a day—a full stomach generally brings contentment.

I have seen men go into the mess-hall at meal-time, and, upon seeing what was placed before them, turn away and leave the room in disgust. And no amount of theory will convince a soldier that hunger is a phantom of his own imagination. The soldier does not consider the amount of work he has to do, providing he has plenty to eat; for the motto of the soldier is, "Feed me and I'll work."

As to pay, that of the private is sufficient; but the pay of the non-commissioned officer is too small. It is all right to compare the private with the unskilled laborer

of civil life, but not so with the non-coms.; they are the skilled laborers of the Army. And good non-commissioned officers will prove a great preventive of desertion.

It will be conceded that a first sergeant needs as much skill as the mechanic. Then, why not give him the same compensation? In civil life, as we all know, it is impossible to obtain the services of a first-class tradesman at a third-class price; and the same rule applies to the Army. If the pay of the non-commissioned officers was increased, say to \$30 for a first sergeant, \$25 for a sergeant, and \$20 for a corporal, per month, there would be plenty of good, well-educated, trustworthy men forthcoming to fill such places; and instead of the ignorant, garrulous, obtrusive lout of the present, you would meet in the orderly-room the competent, pleasant, agreeable man—a man proud of his position and an honor alike to his captain and the company. Although education may not bring contentment, yet the educated soldier comprehends more fully the duty he owes to the Government and the obligation of his enlistment contract.

Again, the aspiring privates should be required to pass, to the satisfaction of a board of company officers, a competitive examination previous to their being appointed non-commissioned officers. This would give every man in the company a chance, and prevent men being appointed in accordance with the wishes of the first sergeant. At present, unless you are a favorite of the First Sergeant's, you need not expect to become a non-commissioned officer, be you ever so fitted for the position.

The soldier is a social outcast, not on account of his uniform, but because he is a soldier. To the minds of many the words "soldier" and "loafer" are synonymous; and this apathy toward the soldier affects him equally alike, no matter what garb he wears, if his occupation be known. The only advantage of civilian dress is, that you are not recognized by strangers as a soldier; and the uniform is a "badge of disgrace" only by reason of indicating the vocation of the wearer.

In time of war the civilian fawns upon the soldier and sings songs of praise in honor of the Army; but in time of peace the general public looks upon the Army as a necessary evil, and the soldier is ignored.

On every possible occasion, the soldier is made to feel that he is a beat and a fraud; and this general indifference, dislike and contempt for the Army is one of the chief causes of desertion. It is hard to retain an honorable man in a calling that is stamped as ignominious and classed as disreputable.

The term of enlistment is two years too long; for men enlist who will never become soldiers, and for five long years, if they do not desert, they are an eyesore to the officers and a blot upon the company. The First Sergeant says he wishes they would desert, for he is tired of looking at them; and the men of the company tell them to go. Yes, the soldier should be taught "something that will make him a better fighting-machine;" therefore, teach him gymnastics, teach him how to care for his person in the field, teach him those things that will enable him to endure the greatest hardships of an active campaign; but do not harass the life out of him because the thumb of his left hand is a quarter of an inch too high at the first motion of "Present Arms."

The question is not, "What causes desertion in our army," but how to reduce desertion to a minimum, for it can never be eradicated. It is useless to attempt to assign a cause for desertion, for it is not due to one, two or three causes, but to a combination of many. As the object is to decrease desertions I would say: Give the soldier better food, and afford him every opportunity for pleasure and amusement when not on duty; increase the pay of the non-commissioned officers, give them some useful practical instruction, and teach the soldier that a military life is not degrading; reduce the term of enlistment to three years, and allow the soldier to purchase his discharge.

FORT McDOWELL, ARIZ., Sept. 16, 1889.

Lieut. M. M. McNamee, Third Cavalry.

"The principal causes assigned by various writers are, poor food, too much manual labor, tyranny of officers, ill-treatment by non-commissioned officers, lack of education in the rank and file, insufficient pay, and excessive length of the term of service." Of all these causes, I will confine my remarks to two; namely, "poor food, or the ration," and "insufficient pay," it being understood that I heartily agree with Lieutenant McAnaney in his opinion of all the others.

1st. To make a man satisfied in any society or occupation, it is a well-known fact, that he must be well fed.

We may dress him in broadcloth and give him carpets to walk on, but if his food is not sufficient, he will not be satisfied.

Now, it has been repeatedly claimed that the ration of the enlisted man is ample, both in quantity and quality.

This is true so far as the pork, beef, and flour part goes, and of the rest as beans, rice, etc., if we propose to give a man nothing but *dried* vegetables all seasons of the year. But how many troop, or company commanders do this? Not any; nor would it be practicable.

The potato and onion are vegetables that all classes in this country use as common articles of food; and as the Army is made up from these classes, it can be no exception. But how are we going to procure these vegetables? They are not part of the ration. We must, therefore, sell some parts of the established ration to procure funds to buy them. This is the only way, unless the men in some manner contribute from their pay, and that is not the intention of the Government.

As bacon, pork and coffee bring the most money, some of these articles are usually left in the Commissary or sold, and the money turned over to the company commander, to make up that necessary resource called "company fund," or, in other words, potato money. Now, as fresh beef, when troops are stationed at a post, is supposed to be issued for four days in the week, and pork and bacon for three, the latter two articles being nearly all sold, the four days' beef is made to do six or seven days, and hence is not sufficient.

Make potatoes and onions a part of the ration, in order that other parts need not be sold, and the ration is sufficient; otherwise, it is not.

It will be said that these vegetables may be produced in post gardens, but my experience has been that those gardens seldom produce one-third of what is needed, and in many localities, owing to climate, nothing at all.

Many good men in the Army, though far from satisfied with their food, owing to being stinted in their allowance of bacon or beef, say nothing, knowing that their company officers are doing all they can for their welfare, and that it is better to do with less meat than to go without fresh vegetables.

While this of itself may not, in many cases, cause desertion, it is certainly one of the principle reasons for discontent.

2d. On the subject of pay, the author seems to have treated it in a general way. He speaks of the pay of the enlisted man. Now in this class, we must include *all* that are not commissioned.

It has been shown in the halls of Congress, and elsewhere, that the pay of the private soldier in the U. S. Army exceeds that of the ordinary laborer, and I agree that the pay of the *private* is sufficient, but the non-commissioned officer is not paid in proportion to the dignity and responsibilities of his rank and duties. *Make the position something to be sought and worth holding.*

The hope of promotion, and thereby more honor and pay, is the great stimulus that has raised armies to a high state of perfection, and now, in time of peace, when

but few men can aspire to anything higher than the status of non-commissioned officer, the importance to our Army of raising the dignity and pay of that grade is self-evident.

Give the non-commissioned officer more pay and he will command more respect; or, a worthy man that *can* command respect will speedily take his place. The intelligent private will then aspire to the position, and it will be an incentive to all good, ambitious men to remain in the Service. As it is now, a private who barely keeps within bounds and escapes punishment, receives almost as much pay as the willing, ambitious corporal, or even the sergeant. Hence, it is considered little loss to lose the position. Resignations are frequent, and, indeed, I have heard good men refuse the appointment, as it brought little consideration and respect for the additional responsibilities.

Therefore, as an addition to the suggestions made by Lieut. McAnaney, I say: *Give the enlisted men all the beef and bacon to which they are entitled (by adding the potato and onion to the ration) and raise the pay and status of the non-commissioned officer*, and I venture to say that the desertions in our Army will decrease one-half.

FORT MCINTOSH, TEX., Sept. 25, 1889.

Lieut. M. Gray Zalinski, 2d Artillery.

The subject of desertion from the Army, its causes, and the many remedies suggested, leaves very little to say that has not already been advocated. It may seem a little assuming to attempt to offer any comments on this matter after old and experienced officers have given their views and opinion, but at the risk of being thought egotistical, I will say, that unless one has been in the ranks and mingled with the men, they can hardly get at the real feelings and thoughts of those who constitute the enlisted portion of our little Army.

To begin with, the term of service, in my humble opinion, is too long. Instead of making enlistments for five years, make the period three. My reason for advocating this is, that a man, no matter how dissatisfied he is with military life, will stay out his term of three years in most cases, (this does not include the professional "rounder") rather than become a deserter; while five years seems to him an age.

The subject of food should next be considered. A diet of "coffee straight" is *not* the best thing in the world to fill an empty stomach; neither will it enable a man to perform his necessary guard, drill and police with that cheerfulness and alacrity which a full stomach inspires. The ration allowance should be increased, so that a sufficient amount of vegetables could be purchased, without saving it out of the other rations allowed by law. Undoubtedly enough in quantity (such as it is) is given to sustain life; but it seems to me that more of a variety would tend to make the men more contented with their lot. No company fund should be allowed to exceed \$50, which is ample for any emergencies that may arise. It is both cruel and uncalled for, to roll up a large fund at the expense of the men's stomachs. The following verse seems to cover the matter, and is directly to the point:

"Of hash that's young, of hash that's old,
Of hash that's hot, of hash that's cold,
Of hash that's tender, of hash that's tough,
I swear to God I've had enough."

Most of the desertions which came under my observation while in the ranks, were directly attributable to the insufficient food. The canteens just established are so manifestly in the interest of the soldier, that it is to be wondered at that they have not been put in force before now. This should extend to all posts.

While speaking of food, it is suggested that a good deal of discontent arises from the fact, that while one company in a garrison (with the same ration allowance) is living well, their comrades next door are on the verge of starvation. Isn't it natural that this should cause discontent? Then why not, at posts where there are two or more companies, have a common mess, both on the score of economy and also to allay, so far as may be, the feeling of envy that the present system engenders? "*Contracted* in the line of duty" is a very appropriate term to apply to the stomach after having lived on such fare as is usually given to our enlisted men. That unusual stress is laid on the question of food is because of my firm conviction that this is one of the principal causes of the large percentage of desertions. Most of the cases coming under my observation while "in the ranks" were directly attributable to the insufficient or badly prepared food.

In regard to ill treatment by officers and non-commissioned officers, I cannot agree fully with Lieutenant McAnaney as regards the latter conclusion. While it is admitted that it is necessary for non-commissioned officers to be upheld in the discharge of their duties, too often they are allowed to confine men for offenses not strictly military, but the direct outcome of some personal difficulty. Too often, too, commissioned officers allow their sergeants and corporals to carry this thing too far. No man should be confined without first being given an opportunity to defend himself before his battery commander. True, it may be some little trouble to the officer, but it should be his duty nevertheless.

Circular No. 6 from the A. G. O. (1889) is a move in the right direction. As Lieut. McAnaney truly says, if the man *will* get drunk, it is far better that he should be in "cits," rather than in a uniform that cannot fail to attract attention of passers-by. Then, too, more liberality should prevail in the granting of passes.

G. O. No. 63, A. G. O. of 1889, might with advantage go one step further. Instead of "forfeiting to the U. S." by sentence of courts-martial (if a forfeiture is made in addition to retaining pay until end of enlistment) it is suggested that it be "forfeited" to the fund of the organization to which the prisoner belongs; for is it not the men of his company who have to make good his guard or duty that his misconduct has caused? Many other things for the betterment of the enlisted men suggest themselves, which for lack of time cannot be written here.

FORT TRUMBULL, CONN., Sept. 25, 1889.

Press Comment.

The subject of desertion from our Army is one that has attracted an ever increasing interest during recent years. To the question, why do the men desert, many answers have been given, but none of them satisfactory. A systematic attempt to investigate the subject was first made in 1882, when a board of inquiry endeavored to ascertain in each soldier's case the cause of his desertion; but, eliminating "dissatisfaction" from the list, there were 80 per cent. of the desertions for which no probable cause could be assigned. Recently a Western newspaper endeavored to get at the merits of the matter by placing one of its reporters in the ranks. He, after serving three months, obtained his discharge, and then gave his experiences and views through the columns of his paper. The more prominent causes assigned by this reporter were the brutality of commissioned and non-commissioned officers, the poor food, the severe labor and the general discomfort of a private's life.

Now, however, we have a valuable contribution to this question in an article in the September number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION, from the pen of Lieutenant McAnaney, of the Ninth Cavalry. As this officer has spent more

than half of his ten years of service in the ranks, his views should have peculiar weight. Why is it, he asks, that 13,000 men have deserted from our army within five years? He takes up the causes that have been most frequently urged and disposes of them, one by one, with a vigor tempered by obvious fair-mindedness.

He shows that the pay of our soldiers, besides being more liberal than that of any other country, fully equals the earnings of laborers in civil life, when all perquisites have been counted in. He insists that there is no brutality on the part of those in authority. The food, if monotonous, is good in quality and abundant as to quantity. The labor is not severe anywhere, and at some posts almost *nil*. Having disposed of the solutions offered by others, Lieutenant McAnaney offers us his own.

According to his theory desertions are caused, 1st, by the monotony of a soldier's life; 2d, its unnecessary restraints; 3d, the low social position of the enlisted man. He brings out the monotony with great vigor. Especially does he object to the endless repetition of the drill. At the end of two months the recruit has learned all that can be learned in this direction, but he must spend the rest of his term in going through, hours each day, exercises which fatigue without improving him. Among the restraints which he singles out for animadversion is tattoo. The necessity of being present in barracks at 9 P. M., absolutely deprives the soldier of all chance of recreation. And he looks upon the necessity of wearing his uniform whenever he visits a neighboring town as highly objectionable. If the soldier should be seen drunk, his uniform and the Service are disgraced. And in this way the Army has acquired a reputation which it is far from deserving.

What Lieutenant McAnaney has to say about the low social position of the private soldier is, we confess, a surprise to us. He seems to put it rather strongly when he says, in italics: "*He is a social outcast, and because of the uniform he wears.*" But in substantiation of this position he brings forward strong proofs—though he suggests no remedy beyond that of allowing him to doff his uniform when on temporary leave.

On the whole this officer's suggestions, coming from so competent and experienced a source, seem to us full of promise, radical though some of them may seem to the old fogies of the Service; and we should be glad to see tried the experiment of substituting, for the eternal manual of arms, sundry manuals of general information likely to make the man a better and more intelligent soldier rather than a mere machine, as well as of letting a little more sunlight into his severely monotonous existence.—*N. Y. Commercial Advertiser*, Sept. 6, 1889.

We called attention yesterday to the startling official figures, giving the number of desertions from our well-fed and well-paid Army, adding a synopsis of Lieutenant McAnaney's article in the JOURNAL OF THE MILITARY SERVICE INSTITUTION. In this article an attempt, and a thoughtful and able one, is made to account for this deplorable state of things.

But we are sorry to have to say that, great as is this evil in the Army, it is worse in the Navy, where, as we learn from the official figures of the Department, that out of 1,890 marines, 925 on board ship, 765 ashore, and of which number 696 were newly enlisted, 125 re-enlisted, there were 390 discharges and 419 desertions. That is to say, more than 22 per cent. of the total force deserted, while of the newly enlisted men the desertions reached 60 per cent. It will be seen, therefore, that no explanation of these facts is trustworthy that does not cover the naval as well as the military arm of the Service.

This question will be treated at length in the forthcoming report of the Secretary of War. Meantime a statement made by Acting Adjutant-General McKeever in

memoranda submitted at the request of Secretary Proctor is not without its suggestiveness. According to General McKeever the greatest proportion of the deserters are American born. We believe that in this fact lies the key to the whole mystery.

It is not to be expected that any strong, active, intelligent man should be content, in the midst of the busy, seething, prosperous American life, to remain bound to a system promising him nothing but moderate wages with no hope of any great increase at any future period. All around their barracks, especially in the West, our soldiers see incessant activity, an activity often meeting with splendid rewards. There is hope of fortune in the outside world, none whatever in their own circumscribed arena. They see clerks blossoming into partners, journeymen rising into bosses, poverty becoming wealth. They do not realize how few the prizes really are; and so they abandon their \$13 per month and hopefully join the struggling, pushing, outside world of toilers. They have joined the Army in a moment of depression, perhaps, or else, looking at military life from the outside, have imagined that they should like it. The illusion quickly passes and Uncle Sam has one soldier the less. Such motives would naturally be more powerful with Americans than with foreigners, who from bitter experience know how hard is the battle of life. But neither foreigners nor natives can be entirely cut off from the influences of our brisk, stirring, hopeful American life. It is the very prosperity of our country that decimates and more than decimates its defenders.—*N. Y. Commercial Advertiser, Sept. 7, 1889.*

III.

"Horse-Shoeing."

J. J. Greenough, Esq.

IN No. 38 of the JOURNAL OF THE MILITARY SERVICE INSTITUTION there is a very interesting article on horse-shoeing by Major Rodney of the 4th Artillery, U. S. A., which has subsequently called out observations from other officers of experience and standing. Having for more than thirty years been an advocate for unshod horses, I have followed the discussion with interest, hoping that it may lead to a more enlightened system in the Army, as well as in civil life. In the remarks drawn out by Major Rodney's article, it is curious to note how strong previous education, and precedent, prevails over actually observed facts, and a scientific, and common sense view of the subject. In any radical change in established usage, conservatism is no doubt wise and useful, if moderately indulged in—wheel horses are as necessary as leaders.

In the expert testimony thus collected, we have the almost unanimous opinion of all the officers of largest experience, that for most purposes it is far better to have the horses, especially in garrison, unshod; the doubt being that this will answer for rough, hard service, over sharp gravel, and rocky, mountain roads; where, evidence is adduced, that it fails. This evidence is the experience had in the hard rides after deserters, and the giving out of Indian ponies, etc., under the strain of long and furious raids. The state of preparation for which is not, however, given. We know that the Indians take no measures to prepare and harden the hoofs of their horses for such unusual work. Now if horses are required to do extraordinary and unusual work, they must be gradually prepared for it; and it becomes an interesting question—not yet solved—how far the animal can be trained for such service, and whether or not it is possible to stimulate nature to the point of successful resistance to such abnormal requirements, without artificial aids; and if it cannot, how far such aids are desirable?

All arguments that are based upon the usages of past centuries, in favor of horse-shoeing, are utterly valueless, unless they can be shown to be the result of careful

experiment, to substantiate their utility, and the necessity therefor. Science is constantly engaged in correcting the mistakes and blunders of past generations. May not this be one of them?

Major Rodney has given us the result of some excellent and well-directed experiments tending to show the inutility of shoeing horses in the military service, which has been supplemented by a number of officers who have had experience in this matter. Those who have not had such experience should not be hasty in rushing into print, with opinions based on abstract reasonings—they are too often fallacious—and we fear that the failure to give Major Rodney the opportunity to practically test the value of his experiment, by marching to Fort Riley, was the result of the unfortunate adherence to prejudices fortified by ancient usage.

A most important problem to be solved is, how far a horse can be trained up to endurance with hoofs unshod; and when, and for what service it becomes necessary to shoe him; and further, if under any circumstances he must be shod, what should be the shoe, and how applied.

It is now very generally conceded, we believe, that the heavy shoes, used in ancient times, and most unfortunately perpetuated to the present day, are relics of barbarism; and that projecting these uncouth clogs out beyond the heel, and nailing them to the quarters, as far back as the clumsy shoer dare, contracting the hoof, pricking it to the quick, and carefully holding the bars and frog from the ground, are evidence of ignorance that should be abated. It is not only known that the heel must be free to expand, but that it, and the frog, must come down to the ground, to keep the hoof healthy. No shoe should be thicker than three-sixteenths of an inch, and it ought to be made of plate steel, a three-quarter shoe should be the extreme limit for size, and four, or at most five, nails be used to fasten it: the sole of the shoe should be perfectly level; if a toe piece is to be put on, weld it to the outside; the front edge of the shoe beyond the hoof may be turned up, if desired, to fit the outside at that point; these shoes should never be put upon a horse but for exceptionally hard service.

Much as has been said in the objections to Major Rodney's plan, and of his system of hardening the feet of his horses, of which I have had no means of judging, we have his results stated, together with those of other able officers, to which I desire to add the following, taken from *Land and Water* in 1883, to which the writer sends a photograph of a well-formed, sound fore-foot of "my *unshod* white-hoofed, low-heeled horse," and he adds: "This photograph was taken after I had driven the old horse (he may be twenty) in a phaeton, a hundred miles, on hard roads in and around London. This does not include drives for exercise." He says the hoofs were not exceptionally good, and that the horse had been the *victim* of the farrier for years, yet over all the evil influences of the miserable *shod* foot, the *unshod* foot has triumphed; when shod he "brushed" and stumbled badly, but barefoot did neither. He cites other cases: "A horse in Africa, working in a post-cart, does *barefoot*, over bad ground, twenty-four miles in two hours [*sic*]."

Race horses are shod in England as well as in this country, yet it is within the knowledge of many sportsmen that unshod horses have won where it was unexpected, and the success was, with reason, attributed to that fact. "Marden" ran *barefooted* in the Sandown Derby, June 2, 1882, against two shod opponents, and beat by three lengths in the deciding heat (though in his first race with them that day he, *with his plates on*, could only dead-beat them). Here the old saying "an ounce at the heel tells more than a pound on the back" was verified. Another instance given in the article I have quoted from says: "I saw a horse the other day which had been doing the work of his master, a doctor, *barefoot*, for over five years, during which he must have traveled, shoeless as he is, thirteen thousand miles, over the not too good roads of East

London, and often with a heavy brougham behind him. The hoofs of this horse are the admiration of veterinary surgeons, and they show no signs of undue wear. This horse was unshod when he was eight years old." The writer cites another horse seventeen or eighteen years old that was never shod, except for a short time, without his owner's knowledge, when in the breaker's hands. This pony was sure-footed *without* shoes, but *with* them she nearly fell as her master rode her home from the breaker's. With these practical instances, and they can be multiplied, it would seem that shoes are, in all ordinary cases, injurious, and that in cases of emergency, they can, and should, be used temporarily only; but, as we have before remarked, the front of the hoof needs protection only, leaving the heel and frog to their natural action.

Nowhere else could this matter be so thoroughly tested as by the intelligent officers in the Government Service, if left unhampered by red tape. Is it not the duty of the Government to pioneer in this matter for the benefit and instruction of the people, to whom the true knowledge of the best methods, established by practical tests instead of theory, would be invaluable?

FORT MCPHERSON, GA., September 10th, 1889.

Capt. Wm. Krause, 3d Infantry.

On reading Major Rodney's paper "A Few Words About Horse-Shoeing," in the May number of the JOURNAL, my memory went back to an experience of my own, in the same line, though on a much more modest scale.

While stationed at Fort Missoula, Montana, I owned a small half-bred horse, for riding only. He was a pretty little beast, and the man who groomed and fed him took great pride in him and asked me to have him shod. This request I refused as I wished him to go unshod, believing he was better so.

It was all very well during the summer, but when the snow came every one declared it was tempting Providence to ride a horse unless he was sharp shod. I paid no attention to the advice but rode him as usual on warm days. The next spring the season at Missoula was peculiar. The warm weather came on gradually and the snow seemed to fade into the ground except where it had been firmly packed on the roads. I had occasion to go frequently to town and the easiest way was to ride this horse, instead of driving in.

Every one knows who has served in Montana that the melting snow freezes at night, and this case was no exception, in fact, all the deep drifts and the road I speak of soon became ice, rather than snow. I, therefore, was obliged to ride over ice every trip I made to town (a distance of four miles) and back again. I declare that although my horse was unshod and the ice of the worst character, rough, sharp and uneven, he never slipped nor stumbled, and although I was timid at first about his footing, I afterwards grew bold, riding at a gallop, and finally preferred the ice-covered road to the clear ground saturated with water. This experiment settled for me, as far as ice and snow are concerned, the question of shoeing riding horses. My horse was light and active on his feet. He did not seem to care for the road, but looked about and enjoyed himself, apparently taking no notice of what was under his feet, so much so that I (though an infantryman) shared his easy in consequence, enjoying the view and all that went on about me, as much as he did.

NORRISTOWN, PA., Sept. 28th, 1889.

IV.

"Commanders-in-Chief."

Lieut.-Col. Robt. H. Hall, 6th Infantry.

THE subject of the Command of the Army was elaborately treated by General Fry and Colonel Wherry in their discussion in the *Field Glass*, in 1879, and there remains little to be said as to what, under a strict construction of the Constitution, should be. The list of "Commanders-in-Chief" published in the JOURNAL for July was merely intended to show what has been.

Washington was appointed by the Continental Congress, in 1775, to be "General and Commander-in-Chief of the Army of the United Colonies." In 1798, he was nominated and confirmed "Lieutenant General and Commander-in-Chief." Each of the other officers named in the list was either the senior officer, the commanding officer, or the General-in-Chief, of the Army, for the time being; and the list was entitled "Commanders-in-Chief," because that is the popular name for the Army commander and is as nearly correct as any that could be selected for that roll of names.

General Brown's criticism, in the JOURNAL for September, is only one of several that have reached me, and, in deference thereto, advantage was taken of a recent revision and republication to call the list that of the "Generals-in-Chief," although, strictly speaking, this is no nearer absolute correctness than is the other.

LOS ANGELES, CAL., September 10th, 1889.

Reviews and Exchanges.

A Dictionary of Explosives.*

BY Major J. P. CUNDILL, Royal Artillery.

IN 1867 Prof. Nobel devised the method of absorbing Nitro-Glycerine by an inert substance and thus forming a safe and practicable high explosive for industrial purposes.

This first "Dynamite" was at once followed by other compounds and mixtures in quick succession until it seemed as though all the "ites" and "ates" and "ines" would be exhausted in furnishing names for the brood of new explosives coming before the public almost daily. This process of multiplication has gone on at such a rate that it has become almost hopeless for any one but a specialist to even keep the run of the names, without attempting to follow the career of each, or to investigate their relative merits.

It is a pleasure, therefore, to know that Major Cundill of the Royal Artillery has compiled a very complete dictionary of all known forms of explosives, giving in a condensed volume all that one cares to know of the great majority of them, together with an introduction, classification and useful directions for handling explosives.

The introduction gives some very clear and complete views of the theory and nature of explosives, and it is very satisfactory to note that although there are in existence some four hundred kinds of explosives, differing more or less from each other, there are only a dozen or more in actual use that differ sufficiently to require any special study. The great majority of them are simply catch-penny devices with only enough difference, and in many cases not enough, to furnish a basis for securing patents.

After Petrofracteur, Saxifragine and other fantastic names, it is a relief to come down to plain "Nitro-Molasses," although it is to be hoped that the latter will never come into general use for culinary purposes.

The dictionary is provided with plenty of blank sheets for the benefit of those who desire to follow up this line of inventions.

W. R. K.

Submarine Mines and Torpedoes as Applied to Harbor Defense.†

BY Colonel J. T. BUCKNILL, R. E.

A most valuable contribution to the literature of torpedoes, or as some prefer to call them Submarine Mines, is the recent publication by Colonel J. T. Bucknill, a retired officer of the Royal Engineers.

This work is a reprint and revision of a series of articles published during the past two years in London *Engineering*, and is clearly and forcibly written and well illustrated and indexed.

* Published by the Royal Engineers Institute, Chatham.

† New York: John Wiley & Sons, 15 Astor Place.

While we should not judge a book by the author's name, we may properly inquire what opportunities he has had of acquiring experience and facts bearing upon the subject whereof he writes.

In this respect Colonel Bucknill has been especially fortunate. Since 1873, he has made a specialty of this branch of engineering, acting as secretary and executive officer of several important War Office committees, as instructor at Chatham and Woolwich, as Inspector of Submarine Defenses, and is now employed as consulting engineer by some of the large establishments engaged in manufacturing instruments and other apparatus used in Submarine Mining.

In this connection it should be borne in mind that England is the great workshop where such supplies are procured by most nations that have become so far advanced in *civilisation*, as to wish to blow each other up, but not quite far enough advanced in mechanical skill to make their own appliances.

Colonel Bucknill, therefore, has had ample facilities for procuring information as to what is going on in this line. Not only in his own country but in other parts of the world; in fact, his chief difficulty is that he knows so much that is required to be kept secret and confidential by his Government, that he is somewhat handicapped in describing the apparatus and systems that he would like to discuss.

This difficulty is, however, more than counterbalanced by the fact that the Colonel is an independent thinker and a prolific inventor, and differs in many respects from the conclusions adopted by the War Office. He, therefore, describes things as he thinks they ought to be, and in many cases intimates that this is very different from the way they really are. In fact, his criticisms read in the light of the excellent description of the English system given many years ago by Major, now Major-General Stotherd, in a confidential book, which was promptly "pirated" and reprinted in Washington, gives us a very good opportunity for guessing at the present condition of the Royal Engineer system.

Our author is an advocate of extreme simplicity in torpedo material, and if it were not a contradiction of terms he might be called a "Quaker Torpedoist." But he is only in advance of his time, and I venture to predict that the first great war in which torpedoes play an important part will relegate much of the ingenious and complicated apparatus that has been devised (to do in a difficult and uncertain way what an intelligent operator can do in the easiest possible manner) to the limbo of the scrap heap. In other words, torpedo material will probably follow the usual course of mechanical development, and after running through all possible changes and complications settle down into a simple, reliable and workable system.

The degree of simplicity required in war material is not generally appreciated, so simple and important a matter as the cutting of a Bormann Fuze was often improperly done, or omitted entirely, during our late war, and the muzzle-loading musket was often loaded two or three times before the soldier discovered that the first charge had not been fired. In fact, one was found on a battle-field with seven charges in it. With such examples in view, we can appreciate the author's anxiety to have torpedo material reduced to its simplest form.

Being prevented by official restraint from using English harbors as illustrations of how torpedoes should be planted and operated, Colonel Bucknill makes use of Cherbourg and New York harbors for that purpose. There is a grim satisfaction in following out his detailed plans for the defense of *our* harbor, and especially in knowing that in all probability the officers of the Royal Navy are equally interested in methods and schemes for its capture.

Without attempting in this brief space to discuss the plans for the defense of the Narrows and East River entrances to our harbor, or to say how near they come to our

own ideas of what such a defense should be, it may be safely asserted that a much *worse* plan could easily be made, and that plenty of officers could be found on this side of the Atlantic whose knowledge of the subject might be increased by a careful study of Colonel Bucknill's plans.

While the book shows bold and independent ideas, the author is liberal and progressive, ready to adopt suggestions from whatever source, provided only that they stand the test of his mature judgment, and on the other hand he as readily discards his own or other commonly accepted notions when they fail to pass the same test.

W. R. K.

Military Miscellanies.*

We cannot too highly commend the example of General JAMES B. FRY in collecting and reprinting in book-form his "MILITARY MISCELLANIES," and thus putting them into proper and accessible form for preservation and future reference. These miscellanies, as they are modestly styled, originally contributed to the periodicals of the day, cover a wide range of "facts, opinions and comments," and are of the greatest interest, not only to officers of the Army of every grade, but to students and legislators who have to do with our military history and institutions. They are necessarily in some degree fragmentary, but coming as they do from an officer of great experience, observation and learning as well as of the highest personal and professional character, they are in every way worthy of their author and of the dignity conferred upon them by the publishers.

To the older officers of the Army General Fry's useful and highly honorable career is fully known, and is a sufficient voucher for the merit of any publication to which he puts his name, but to the younger officers, and to the country at large, a few words of explanation and biography may not be out of place.

General Fry comes of a highly respectable family connected with the earlier history of Illinois. Abraham Lincoln and his father were comrades in the Black Hawk War. He graduated at West Point fourteenth in the class of 1847, was assigned to the First Artillery, and after a brief period as Instructor of Artillery at the Military Academy, he joined the Army in Mexico. After peace was established he served successively at Fort Columbus, New York, in Oregon and Washington Territory, Florida, Louisiana and Mississippi; at the Military Academy as Instructor of Artillery, and Adjutant at the Artillery School for practice, as recorder of a board to revise the programme of instruction at the Military Academy; on the frontier at Fort Leavenworth, and finally in command of a battery of light artillery at Washington. In 1861, he was transferred to the Adjutant-General's Department, and served with General McDowell as chief of staff during the Manassas Campaign and the battle of Bull Run. After that, he was chief of staff to Major-General Buell while commanding the Department and Army of the Ohio, taking part in the battle of Shiloh, the siege of Corinth, and in the operations in Northern Alabama, Tennessee and Kentucky, till October, 1862. He was then put in charge of the appointment branch of the Adjutant-General's Office in the War Department. In March, 1863, he was appointed Provost Marshal-General of the United States, which office he held till it was abolished in 1866. He was then assigned to duty as Adjutant-General of the Military Division of the Pacific, where he served three years, going thence in turn to the Military Divisions of the South, the Missouri and the Atlantic. During all of this time he had but one short leave of absence. Constantly at his post of duty, with his battery, at the headquarters to which he was assigned, or in the War Department, he was not only a close student of everything pertaining to his profession, but was intimately associated with the leading generals and

* By James B. Fry, Bvt. Major-General, U. S. A., New York: Brentano, 1889.

civilians of the period. Always a student, and conspicuously an officer of the rarest ability, he necessarily discharged every duty, no matter how complicated, with conscientious fidelity and unflinching judgment, and had he not been so useful, in fact, so indispensable in the staff, must have reached the highest rank, in the actual command of troops. His appointment to the office of Provost Marshal-General was a rare piece of good judgment on the part of the Secretary of War, and of good fortune to the country, for it brought to their assistance when in their direst straits, the man of all others, who was best fitted, by temper, knowledge and experience to give them the help they so imperatively required at that time. It would carry us too far from our subject to describe in detail the condition and needs of the Army at that critical period of the War, but we cannot forbear to point out that the waste of life had been enormous, and that the subject of repairing the strength of the Army, by volunteering, and later by the draft, was one of vital importance to the Nation. Of course, no one familiar with our form of government and our military policy, perhaps, it would be better to say, our lack of military policy, will for a minute, hold General Fry in any way responsible for the laws which governed these important matters, or for the wisdom of the administrative measures resorted to for giving them effect. His duty was to carry out the general instructions received from the Secretary of War, and it is not too much to say that he did this with a degree of fidelity, fairness, courage and completeness rarely ever equalled and never surpassed by a public officer. Neither the argument of friends, the insolence of demagogues, nor the devices of the public enemy could swerve him from his duty. He encountered every form of intrigue, and every form of personal and official solicitation, but was proof against them all. The politicians threatened him, and the mob broke out in riotous violence, but he calmly faced it all, and enforced the law to the very letter. He disbursed enormous sums of public money honestly and without scandal, and when peace had settled upon the country, laid down his great powers, without a thought of personal aggrandizement and with no reward except the brevet of Major-General in the Regular Army "for faithful, meritorious and distinguished service in the Provost Marshal-General's Department during the Rebellion."

It is but scant praise to say that General Fry has so far given his whole life in loyal and intelligent labor to his country, and that but few graduates of the Military Academy, however great their offices and opportunities, have ever more richly repaid the country for the education received at its hands. Nothing but a detailed account of his services, which, it is to be feared, his modesty, surpassed only by his merits, will not permit him to prepare, can give his countrymen any adequate idea of their indebtedness to him. Like Meigs, who also bore a tremendous burden nobly and well, and received but scant acknowledgement therefor, he is now on the retired list, but not from age. Fortunately for him, he is able to live as he pleases, and fortunately for the Army, he is able from the rich storehouse of his knowledge and experience to enlighten it upon almost every question which engages its attention.

At this precise period, when the Indian question no longer affords the principal reason for the maintenance of a Regular Army, and Congress must necessarily begin soon to look for considerations of a broader and more national character, to guide and give shape to its legislation in respect to this branch of the public service, it is to be regretted that a way cannot be devised to utilize the knowledge and experience of such officers as Generals Fry and Meigs and the historical researches of such students of our military archives and records as the late General Upton. It is evident that Congress must at an early day devise a system of military institutions and administration better suited to the advancement we have made in population, wealth and capacity for war, and better calculated to meet the exigencies which may arise at any time from domestic outbreaks and insurrection, or from war with a first-class foreign power.

The Military Miscellanies under consideration show conclusively that General Fry is qualified to deal with such subjects, broadly and intelligently, not only as a practical military specialist, acquainted with the various branches of military knowledge and administration, but as a student well versed in the history of our military institutions, and profoundly impressed with the fact that the military powers of the Government should be everywhere and at all times subordinated to its civil powers.

Part I. of the Miscellanies under consideration contains eleven papers extending over 275 pages of the work under consideration, all of which deal with the very essence of our military institutions. The author clearly defines the war powers of Congress, and those of the President as "Commander-in-Chief of the Army and Navy of the United States and of the militia of the several States when called into the actual service of the United States." He also points out with admirable clearness the meaning of "office," "commission," "grade," "rank," and "title," as words used in our military laws. He discusses the subjects of "authority," "promotion," "transfers" and "brevets," showing conclusively that the latter are "commissions in the Army at large," conferred by the President in pursuance of law, confirmed by Congress, and subject to termination only by due process of law. He shows that the contention of the War Department that such commissions fall with the actual or *solid* rank held in the line or staff of the Army, is erroneous and without the sanction of law, and that those who have honorably won and received them cannot be rightfully deprived of them except by legal muster-out or discharge, or by the sentence of a court-martial, duly entered and approved. If he is right in this conclusion, and there appears to be no good reason to doubt it, every officer of the Regular Army who has received a brevet commission, and has resigned only his "solid" corps or lineal rank, is still an officer in the Army at large, but, of course, without pay, and as such is clearly entitled to have his name borne upon the records of the War Department and upon the Army Register, and is liable to such duty in emergencies, as the President may lawfully require of officers by brevet. The same is true of the volunteer officers who received "brevets," and it was in recognition of this fact that the Hon. Richard W. Townshend, of Illinois, Chairman of the Committee on Military Affairs, of the House of Representatives, of the Fiftieth Congress, introduced a bill defining the meaning of the word "brevet," as used in the military laws of the United States. The bill was not acted on, perhaps as much from prejudice as from indifference to the subject, but it is nevertheless one of importance, for it immediately concerns the honor and welfare of the Army as well as the rights of many who have gallantly won its chief distinction. No government can long afford to discredit its own commissions, and when they impose no burdens on the public treasury, it is difficult to imagine any good reason why they should not be duly recorded, entered upon the Army Register, and dignified by all proper means known to the law.

"The brevet," General Fry well says in conclusion, "has the merit of being conferred by the President and Senate of the United States, and in its complimentary character it is akin to the 'thanks of Congress.' The truth is, though it be not openly confessed, that, abused, abridged, emasculated as the brevet has been, the Army loves it still. It has its faults, but the worst of them might be removed. The indiscriminate distribution of brevets after the War of the Rebellion no doubt contributed to producing legislation, which not only restrains the appointing power in conferring this reward, but deprives the reward of advantages it formerly possessed. If the brevet is to be retained as a stimulus to enterprise—we have no other—the proper course would be to increase its value and at the same time restrict its bestowal to cases of clearly-defined and well-established gallant actions.

"One step towards increasing the value of the brevet would be to let it carry a speci-

fied pay, independent of all contingencies of command. That of itself ought to impose caution in its bestowal. With that provision, with the right to command, as at present, when assigned by the President, and with suitable insignia on the regular uniform, the brevet would probably be the best form of reward and stimulus to enterprise that can be devised for our Service."

The General treats with the same perspicacity the questions of "retirement," of "reducing pay," of "renting quarters," of "change of station," of "forage for officers' horses," and of Army mutual life insurance. He also discusses "the duties of an adjutant-general," and gives the history of the Army Regulations, in a manner which cannot fail to interest all military men of the present day.

In a chapter devoted to "the Command of the Army," he defines the constitutional powers of the President as Commander-in-chief, and points out his relations to the Secretary of War, to the War Department and its various bureaus, to the General-in-chief, to the Army and Navy and to the Militia. He also defines the legal relations of all these to each other, and supports his statements and conclusions by reference to the opinions of the Attorneys-General and the decisions of the Supreme Court. He effectually disposes of the claim set up not many years ago for the legal independence of the General-in-chief of the Secretary of War, and completely vindicates the action of the late General Rawlins, while Secretary of War, in countermanding that order of his immediate predecessor, by which the heads of the War Department bureaus became simply the staff-officers of the General-in-chief. The work before us contains the discussion between General Fry and Colonel Wherry concerning the points involved in this very matter, and we commend it to the attention of such civilians as feel that they are likely to become Secretary of War, and to all Army officers who may become General-in-chief. No one who reads it carefully can fall into serious error as to the law or the reasons for its peculiar provisions.

"Law in the Army," "Obedience in the Army," "Justice for the Army," and "the Honor of the Army," are considered separately, and with such intelligence, accompanied by such abundant reference to actual cases, as to bring out the true principles with the greatest simplicity and clearness. As a means of securing greater justice to Army officers who may be tried by court-martial, and especially for the purpose of substituting judicial investigation in such cases as are now required to go to the President for confirmation and which are frequently brought before Congress for its action, Colonel Lieber, of the Judge Advocate-General's Department, has suggested "A Military Court of Appeals," and General Fry discusses this proposition from every possible point of view, illustrating the subject with plentiful references to history, to the Articles of War, to the opinions of lawyers and publicists and to the decisions of the Supreme Court. His conclusion is as follow :

"It is true that the power of Congress and the President's pardoning power would exist with a Military Court of Appeal, just as they do without it, but the temptation and the opportunity to exercise these powers would be materially reduced. Moreover, the rights of the accused must be fully weighed. The sentences of dismissal awarded by courts-martial are sometimes wrong. While the President's pardoning power, or an Act of Congress, may prevent some of the consequences of the wrong, neither the President nor Congress can proceed judicially in ascertaining the truth, nor can they rectify the wrong. That could only be done fully, on ascertainment of truth through a judicial tribunal, created and empowered for such cases. Do we need one ?

"The sentence of dismissal (with which we are dealing, as the matter of practical importance) is blasting in its consequences. It involves loss of profession, loss of pay, and loss of reputation. The same 'rude tribunal' which has had final jurisdiction of it for centuries, has it still. Yet, as we are told, and admit, 'Military law is not a

stagnant pool. Within its own sphere it is progressive.' Will that progress justify the establishment of a Military Court of Appeal as a remedy for the evils which have been indicated? Would the remedy be worse than the disease? Military punishment should be *prompt*, but it must be *just*. Taking things as they are in our Service would delay in final action in cases of dismissal be increased or reduced, by having a Court of Appeal, with all the finality of jurisdiction that law could confer upon it?"

"Neither the legislative nor the executive branch of the Government is disposed to violate its trust in the action of which we hear so much complaint concerning dismissals. They merely grope for justice, which such a tribunal as that under consideration might make so clear as to prevent their interference, or at least so probable as to give them good grounds for declining to interfere."

A "regular army so elastic as to fit it for expansion to meet the demands of war and for contraction to accommodate itself to the requirements of peace," has long been aimed at by legislators as well as by military men, but so far neither have been able to devise a scheme which Congress would approve, and General Fry, after a careful consideration of the various measures proposed, not only doubts their efficiency, but declares that "such a system is wholly unsuited to our Government and to our people in their present condition." He claims that it can be applied only to nations "in which every male is born into the military service," and adds that:

"So far as the United States are concerned, the advantages of an elastic regular army, such as has been proposed for ours, are purely theoretical. The difficulty of *expanding*, so as to grapple with sudden emergencies, would, as suggested in the foregoing remarks, be very great; but the difficulty in that direction would be no greater than in the opposite one of *reduction*, after an increase had once been made. Congress has, especially since the close of the Rebellion, had much experience on this point, and should be fully able to estimate the magnitude of the effort necessary to effect a reduction of the Army. Justice to those who render great services in time of war, coupled with the various personal questions which arise, makes this a grave matter. There is no more difficult and painful task than to dispose of the crop of heroes left by war."

One of the most interesting and important chapters of General Fry's Military Miscellanies is the one in which he discusses the standard of admission to the Military Academy. It has long been the desire of the Academic Board to escape from the drudgery of elementary instruction, and to this end the examinations for admission have been gradually made more and more searching. Up to 1866, the law required that each cadet previous to his appointment by the President should be "well versed in reading, writing and arithmetic." In that year Congress enacted that candidates "shall be required to have a knowledge of the elements of English Grammar, of descriptive Geography, particularly of our own country and of the history of the United States." Under this law the standard was materially raised, but General Fry contends that the law has been applied with unnecessary severity, and that an increasing number of rejections has resulted, without any corresponding advantage to the country in the quality or number of the graduates turned out. He points out that the Chinese method, by which the candidates are numbered and required to return written answers to the questions propounded, is not only no improvement on the old system of oral examinations, but is distinctly a retrogression which operates to the injury of the Academy as well as the candidate. Every aspect of the case is fairly presented. The interests of the country at large, of the Army, of the various Congressional Districts, of the Academy and of its pupils, are fully considered. The subject is a practical one of great importance calling for the interposition of Congress, and were such men as General Fry returned to that body there can be little room to doubt, that legislation, on this as

well as other military subjects, would be materially improved. General Fry's conclusions are modestly stated, as follows :

" The foregoing remarks are designed to show that the examination required by law for admission is not conducted as it ought to be. But beyond this, considering all the facts on the subject, especially the way appointments to the Academy are made (one from each Congressional District on the recommendation of the Member of Congress), it is quite possible that it would be better to dispense by law with a mental examination for admission, and let every physically qualified appointee enter upon the course and remain until found deficient *in a subject taught by the Academy*. This would require the Institution to bestow six months or so of its labor on a much larger number than it does now. But none of the instruction would be lost. Much or little, it would in cases of discharge be taken back to be 'imparted and diffused' in the Congressional District entitled to it.

" It would simplify matters at the Academy if every appointee were capable of graduating. But that is hardly possible. A preparatory year as a part of the course of the Institution, in addition to the four years' term, as at present established, might increase the percentage of graduates, and would afford appointees a fair chance of admission to the regular course.

" In providing a military education for a limited number of its sons, the Government certainly ought to see that its bounty is wisely bestowed. Could not that be done sufficiently well by care in appointment, rather than by *rejecting the appointee before he has had a trial in the course taught by the Academy*? In any event, the Academy will not fail to do its part in providing a *good education*, in the broadest acceptance of the term, for all appointees confided to it."

It is but proper to add that while these views have been ably combated by Professor Andrews and others, speaking for the Academic board, it does not appear that their soundness has been shaken. To the contrary, judging from the discussion they have received, and from the approval given to them by many of the most accomplished officers of the Army, it is fair to conclude that General Fry is right, and that he has pointed out a practicable method of making the Military Academy not only more useful, but much more popular with the people at large.

The last, but by no means the least important of the purely military articles under consideration, is a discussion of the "Militia" and its relations and value to the public defense. This discussion grew out of a paper read by General Sherman before the Military Service Institution, and covers all the fundamental considerations involved, not only in the provision of the Constitution and laws, but in the wisdom of the popular idea pertaining to it. He dissents entirely from the views of General Sherman, and while he "does not underestimate the value of military organization and instruction among the people," to whom the Government must always go in one way or another for its defense and support, he declares that, as he sees it, "the General Government can accomplish no appreciable good under its power for organizing and disciplining the militia." He supports this view by a careful analysis of the character of the militia and of its relations to the State, and to the National Government, pointing out the manifold and fatal limitations upon its efficiency as a part of a modern army, and illustrating the defects and expensiveness of the entire system by reference to the history of the country. In this connection it is worthy of remark that his conclusions are confirmed by the independent and much more extended investigations made by the late Major-General Emory Upton, and set forth in his unpublished work on "The Military Policy of the United States." It may not be generally known that the manuscript of this work was left by General Upton to his sister, and by her offered to the Government on the condition that Congress would publish it, and give her three hundred copies. Her offer

was considered by the House Committees on military affairs and referred to the Committee on printing. The latter after mature consideration reported unanimously in favor of accepting the offer, and printing 5,000 copies for the use of Congress and the Army, but Congress failed to take action upon the measure, and it necessarily fell with the unfinished business of the term. It remains to be seen whether the new Congress will take the requisite steps to put this valuable work within the reach of military students and statesmen. Fortunately for the country, General Fry was able and has been spared to publish his own works, and thus give a new value to his public services. It is to be hoped that Congress when it seriously takes up the subject of providing adequately for the public defense, will profit by the study and works of both General Fry and General Upton. Certainly it could not find more conscientious or more competent guides, in the lines of special investigation which they have followed, and any country in which perpetual peace is not assured would make haste to utilize what is so freely given for the public good.

Part II. of the "Military Miscellanies," contains a series of interesting papers on Lincoln, Grant and Halleck, which throw a flood of light on these great men, and their relations with each other. It also contains, in a review of Nicolay's "Outbreak of Rebellion," the best account we have yet seen of the first battle of Bull Run, and the causes which led to the defeat of McDowell's army. Written as it was from his personal observations, as well as from the records, this paper clears up several hitherto obscure points and does the cause of history good service, in relieving General McDowell from the unjust load of obloquy heaped upon him by ignorant and prejudiced writers. The reviews of Gustavus W. Smith's "Confederate War Papers," Doubleday's "Chancellorsville and Gettysburg," "De Trobriand's Four Years with the Army of the Potomac," Pittinger's "Capturing a Locomotive," Keyes's "Fifty Years Observation of Men and Events" and "Farrer's Military Manners," are models of kindly but incisive criticism. His account of the killing of General Nelson by General Jefferson C. Davis is a graphic but dispassionate narrative of one of the most tragic events of the Rebellion, while the paper upon "Custer's Defeat by Sitting Bull," divides the responsibility for that unfortunate affair between the gallant hero who was its most conspicuous victim, and those who were charged with the graver duties of planning the campaign. General Fry, after briefly but clearly stating all the essential facts of the case, with a candor which arouses anew the sympathy of the reader for Custer and his heroic followers, concludes with the following impressive and conclusive statement:

"Neither ambition, nor wounded vanity, prompted these fatal dispositions, nor were they due to lack of knowledge of the principles of his profession. They proceeded, as heretofore stated, from a misconception, which Custer shared with others, in relation to the numbers, prowess, and sagacity of the enemy."

It is not to be expected that everybody will agree with General Fry in all the conclusions set forth in the volume before us, but no fair minded man can read his writings without admiring the intelligence of his understanding, the clearness of his style, the logical coherence of his arguments, or the patience, learning and good temper which he displays upon all occasions.

J. H. WILSON.

Cruising in the Cascades.*

In "Cruising in the Cascades" every true sportsman will find a volume after his own heart. The descriptions are very realistic, and the reader, in his imagination, expands his chest with the author and drinks in long draughts of cool, pure, but rarified

* *Cruising in the Cascades and Other Hunting Adventures.* Chicago: Rand, McNally & Co.

air from the summit of some Cascade peak, or, with him, he rushes in mad stampede, surrounded by the thunder of bisons' feet beating into dust the alkali plains of Northern Texas.

Mr. G. O. Shields (the author) is evidently an ardent huntsman, and the work of placing in print the narrative of his adventures has evidently been a labor of love. In some of the descriptions, the reader can easily imagine the author's fingers tingling with the pleasant excitement produced by recalling the supreme moments of the chase, and it is small wonder that the reader is carried along by the effective word-painting.

Mr. Shields rises to the point as a humorist in a dry kind of way when occasion demands it. The following is an example in which he describes the rather forcible descent of a slippery hill made by himself and the ten Indian guides:

* * * * "The stick played a lone hand, but raised me clear out in spite of my struggles. I uttered a mournful groan as I saw myself going, but was as helpless as a tender-foot on a bucking cayuse. * * * I spread out like a step-ladder and pawed the air for succor, but there was not a bush or branch within reach. I think I went ten feet before I touched the earth again, and then I landed among John's legs. He sat down on the back of my neck like a trip-hammer, and we both assaulted Seymour in the rear with such violence as to knock him clear out. For a few seconds we were the worst mixed up community that ever lived, I reckon. Arms, legs, guns, hats, packs, and human forms were mingled in one writhing, squirming, surging mass, and groans, shouts and imprecations in English, Chinook and Scowlitz rent the air."

The English throughout the book is generally excellent, but the memory of whirling reels and bending rods prove too much for the author, who, in his chapter on trout-fishing, makes the following rather startling statement.

"However, Colonel Gibson, of the U. S. A., commanding Fort Missoula, took one on a fly that weighed nine pounds and ten ounces." One naturally is lost in conjecture as to the weight of the fish that was caught on such a ponderous fly.

The book is admirably illustrated throughout, largely from photographs taken by the author, who acted as his own "artist on the spot."

E. M. L.

Recent Literature of the Hospital Corps.*

The organization of a new corps in connection with one of the scientific departments of the Army would naturally be followed by the production of a considerable amount of literature bearing upon its training and work. When, moreover, the experiences of foreign armies in the same direction for three-quarters of a century are available as a foundation upon which to build a system adapted to our Service, our authors have much to assist them, and the Service is justified in expecting much from them. The subject has been before the officers of the medical department now for nearly two years, during three-quarters of which time a provisional manual has been in their hands for criticism and improvement. It would seem that by this time their experience had about reached the stage of crystallization when a judgment might well be pronounced upon it. The board of officers, to whom it is understood that this matter is about to be submitted, will have ample material with which to work.

The first system to be publicly demonstrated, was shown before the Military Service Institution in March, 1888, and published in the following number of the JOURNAL. The authorized provisional manual followed hard upon this and from time to time the various systems enumerated in the foot note have appeared. It is not practicable to discuss here in detail and singly each of these systems. All of them present advantages and disadvantages and in many instances the discrimination between the desira-

* For List of Publications see end of this article.

bility of the methods of attaining the same result devised by two officers is difficult in the extreme. The present note then will deal with the matter only in a general way.

Certain requisites indispensable in a system for the carriage of the disabled were presented in the JOURNAL for June, 1888. A continued study of the subject during the intervening period, reinforced by a careful collation of nearly a hundred works on the same topic, prepared by our own and foreign writers, has tended to still further show the correctness of these premises, viz.: (1) The necessity of a uniform and definite system; (2) Ease and simplicity of manœuvres; (3) Adaptability to varying numbers; (4) Clearness, brevity and individuality of commands. To these may be added (5) the necessity for complete instruction in the extemporization of appliances for carrying the wounded in the absence of regulation apparatus. (6) The great importance of copious illustrations by the observation of which the person, to whose undrilled mind the printed instructions are incomprehensible, may be able to see at a glance the character of the manœuvres, and (7) the desirability of including all the required instruction of the same character in the same book and not referring to other works for instruction in any part of the required drill of the corps.

None of the works under consideration completely fulfill these requirements, although all are agreed as to the first. The second, however, seems to be the chief stumbling block over which they fall. In periods of active hostilities, there is no time for complicated movements, and all unessential details will be thrown aside. Recognizing the uselessness of instructing soldiers in peace in points which are sure to be abandoned under the practical test of war, the military mind of the present is rapidly eliminating the machinery of manœuvring and tending toward simplicity of action. In preparing movements for the Hospital Corps, we must keep abreast with the age in this respect as well as others. In the system published in the JOURNAL, to which reference has already been made, in getting his bearers from their formation in rank to their places about the litter, the author gives four commands when, by disregarding an unessential point, he might have attained the desired result in one quarter of the time and with but a single command. His purpose was to bring the bearers into such a relation to one another that the bearers nearest the same height should be paired. But this is unessential, because the four men forming a squad will not—if the detachment has been sized in the usual manner—vary greatly in height and any variation can readily be compensated for by adjustment of the litter slings. This is sufficient ground for the abandonment of this manœuvre, beautiful though it is. In most of the other systems, movements equally as complicated have been advanced with equally little justification. The elimination of these non-essentials and cutting down the manœuvres to the demands of necessity must now be an important feature of the preparation of a drill manual.

The question of the amount of latitude to be given in the performance of movements and how much to yield to the tendencies toward simplicity now in vogue is one which naturally arises in the mind of the reader of these works—so greatly do they vary, some presenting little but the management of the patient alone, while others go quite extensively into the subject of ambulance manœuvres. A mean between these extremes would seem to satisfy the demands of our Service. A brief drill-manual should contain all the instruction needed by the ordinary bearer. A more extensive treatise, discussing the subject minutely, although not perhaps prescribing exact rules for action, combining the good features of Roberts' *Manœuvres d'Ambulance*, and Longmore's *Treatise on Ambulances*, might embody the more comprehensive knowledge needed by the medical officer or hospital steward.

In the main, our fourth requisite has been observed, although in some cases brevity

in a command is sacrificed to an attempt at clearness and in others clearness is lost in effort to secure brevity. It is a little difficult to conceive of a bearer squad, engaged in collecting the wounded under a brisk fire, stopping long enough to utter and execute the command, "Prepare—to—lift—litter, Lift litter," of some of the systems. The order of "Lift, Litter" of others, on the contrary, is not definite enough to secure the uniform and synchronous adjustment of the slings and the lifting of the litter. The division of this act into two divisions, the adjustment of the slings and the lifting of the litter is objectionable on account of presenting additional complication.

In some of these works occur instances where the grammatical construction of commands is faulty, an order intended to direct motion being without a verb. This can hardly be necessary in any case, and a correct construction should be substituted for it.

Extemporized methods of transporting the wounded are of importance, fully equal to the management of prepared appliances, for the occasions where the latter are lacking are so frequent and the need of help in such cases is so great that a familiarity with off-hand methods is of the utmost importance for every officer or soldier. In view of this fact, the limited space given by most of our authors to this subject is astonishing. Now, however, that the management of the authorized appliances has been so well worked out, we may hope for more work in this direction from those who are looking "for more works to conquer."

The question of illustrations is a more difficult one to solve, on account of the expense of providing proper engravings, and as those works are generally published by the authors, this would justify their absence in the majority of cases. Now that photography has become so simple, the factor of artistic faculty has been eliminated, for photographs can be directly reproduced by the photo-engraving process, producing engravings which are not despised by the most artistic of our magazines. The reproductions of Col. Heger's exquisite photographs, in the article on Transportation, in the *Reference Hand-book of Medical Sciences*, are beautiful specimens of this process. With the camera and the subjects, both available at every post, the topics can abundantly be illustrated and the text most completely elucidated.

One feature which it would seem advisable to alter in some of these monographs is the plan of failing to explain certain manoeuvres which are described in the authorized tactics. The convenience of readers would be greatly advanced if the books were complete in themselves. If the method as described in the tactics is the most desirable for the Hospital Corps, let it be adopted by all means, but also engraft the description of the movement from the tactics into the proper place in the hospital corps drill manual, modified as may be necessary to suit its new surroundings.

If the faults rather than the merits of these works have been dwelt upon it is not because they are in the excess or even conspicuous. An enumeration of the good features would occupy much time and space, and as has already been remarked the choice of the best method from so many good ones would be a matter of no little difficulty.

JAMES E. PILCHER.

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- HAVARD, VALERY (Captain, Medical Dept. U. S. Army): Manual of Drill for the Hospital Corps and Company Bearers of the U. S. Army and National Guard. Bismarck, Dak., 1889, 12 mo, pp. 68, 27 illustrations.
- HEIZMANN, C. L. (Major, Medical Dept. U. S. Army): A Provisional Manual of Instruction for the Hospital Corps, U. S. A., and Company Bearers. Prepared under the direction of the Surgeon-General, U. S. A., Washington, 1888, 12 mo, pp. 34, 11 illustrations.
- HOFF, JOHN V. R. (Captain, Medical Dept. U. S. Army): Notes on Bearer Drill with Hand-Litter. Ambulance Wagon, etc., supplementary to [Heizmann's] Provisional Manual of Instruction for the Hospital Corps and Company Bearers. Fort Reno, I. T. 1888, 12 mo, pp. 53, 29 diagrams.

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- SMART, CHARLES (Major, Medical Dept. U. S. Army): *Handbook for the Hospital Corps of the U. S. Army and State Military Forces*. New York: Wm. Wood & Co., 1889, 16 mo, pp. 577, 96 illustrations.
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FOR REVIEW.

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- Submarine Mines and Torpedoes as Applied to Harbor Defense.* By John Townsend Bucknill, Honorary Lieut.-Colonel (late Major R. E.) Reserve of Officers, etc. (New York.) John Wiley & Sons, 1889.
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OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

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Aldershot Military Society Papers.

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Revista di Artiglieria e Genio. (July, 1889.)

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The Century. (September, 1889.) Napoleon in Exile. Lincoln: Cabinet Changes. Lincoln Re-elected. Chase as Chief Justice. The History of the Kara Political Prison. (October.) Lincoln. Blair's Mexican Project. The Hampton Roads Conference. The XIIIth Amendment. Three Jewish Kings. War Diary of a Union Woman in the South. A View of the Confederacy from the Inside.

Scribner's Magazine. (September, 1889.) Danger Ahead. Safety in Railroad Travel. The Small Arms of European Armies. (October.) How I Crossed Masai Land. Electricity in War. A Summer in Iceland.

The United Service. (October, 1889.) The Canadian Question. The Nez Percé Indian War. Old Uniforms of the United States Service. From Bars to Stars.

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Journal of the U. S. Cavalry Association. (September, 1889.) A Horse's Foot. My Ride Around Baltimore in 1864. Letters on Cavalry. New Drill Regulations for Cavalry, U. S. Army.

- Proceedings of the U. S. Naval Institute.* (Vol. 15, No. 3.) Quick's Patent Perforated Cake Powder For Ordnance. The Homestead Steel Works. Ship Building and its Interests on the Pacific Coast. The Naval Ordnance Proving Ground. Gun-Cotton—Its History, Manufacture, Use. Electricity on Board War Ships. Notes on the Literature of Explosives.
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- Political Science Quarterly.* (September, 1889.) Town Rule in Connecticut. Railroad Indemnity Lands. English Legal History.
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- Publications of the Department of Agriculture.* (To date)
- Science.* (To date)
- The Army and Navy Register.* (To date)
- Philadelphia Weekly Times.* (To date)
- The Boston Courier.* (To date)
- The Bookmart.* (To date)
- The Volunteer.* (To date)
- The National Guardsman.* (To date)

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George Hamilton Cook,

Born at Lockport, N. Y., Oct. 10, 1846,

Died at David's Island, N. Y. I., Oct. 4, 1889.

Extract from the Minutes of a meeting of the Executive Council, Military
Service Institution, held at Governor's Island, N. Y. I., Oct. 15, 1889;
General Tompkins in the Chair.

* * * *

Whereas the sudden death of Captain GEORGE HAMILTON COOK, Quartermaster's Department, United States Army, and late a Member of this Council, calls for the following mention:

Captain COOK possessed a rare combination of personal and professional virtues. In the prime of life, of fine physique, genial manners, and cultivated mind, he was eminently fitted for his official position by his natural gifts as well as by his business training and service in the Line of the Army. His progressive and practical views in matters of military administration, his originality, industry, and conscientious scrutiny of expenditure, had already attracted the notice and secured the approbation of the Government. An important enterprise, somewhat experimental in its nature, intended to promote the comfort and well-being of the enlisted soldier, had been entrusted to Captain COOK, and in the moment of its fruition he fell; literally "dying in harness."

The zealous and unselfish efforts of Captain COOK to promote the interests of the Military Service Institution are gratefully remembered by his associates on the Council, who extend their heartfelt sympathy to the members of his family.

Resolved, that a copy of this Minute be transmitted to the widow of the deceased, to the Adjutant-General, and to the Quartermaster-General of the Army, and be published in the JOURNAL of the Institution.

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A TRUE COPY.

L. J. Robinson
Secretary.

